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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 131

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OPERATIONS OF RAJASTHAN NUCLEAR PROJECT REVIEWED

Madras THE HINDU in English 26 Dec 81 p 8

[Article by N. N. Sachitanand]

[Text]

THE Rajasthan Atomic Power Project at Rawatbhata near Kota is again in the news, this time for a shutdown of its first unit due to a cooling water leakage problem in the endshield The reportage on this has been so confusing and full of technical half-truths that facts on RAPP have been sought from the horse's mouth

Given below is an account of this atomic power project's history and performance as furnished by Dr M R Srinivasan, head of the Power Projects Engineering Division of the Atomic Energy Commission

Although the first commercial nuclear power reactor to go on stream in India was of the boiling light water type supplied by General Electric of the United States the Atomic Energy Commission decided to opt for the Canadian designed Candu type heavy water cooled and moderated reactor for the country's atomic power programme since the latter permitted the use of natural uranium as fuel (Production of enriched uranium needed for the Tarapur type light water reactor is prohibitively energy and capital intensive for us)

Unfortunately, when the first unit of RAPP was being designed, the only operating experience available on such heavy water reactors, even with the Canadians who were then associated with us, was on an experimental 20 MW facility On top of this, following the Pokhran experiment in 1974 Canada abruptly cut off all nuclear connections with us The result was that much of the development work had to be done on a first time basis for RAPP-1 in India itself by Indian scientists and engineers

Turbine blade failure

One of the first breakdowns that occurred in RAPP-1 after it was commissioned was turbine blade failure This happened on three different occasions The Canadians, who had supplied the turbine generator, had themselves no experience of designing and making large turbine generators and had used a British design This inadequacy in design and manufacture led to early blade failures

A second cause of frequent outages in the early years of operation of RAPP-1 was the weak grid into which it was synchronised At that time, the Rajasthan grid had a capacity of only 500 MW and any overloading of this small capacity grid resulted in frequency drops which caused the RAPP turbine to trip It was only after 1975-76, when the Bhakra and Rajasthan grids started operating in parallel that such trips have decreased

In 1977 78, there was a prolonged labour agitation and strike at RAPP which not only contributed to difficulties in operating RAPP-1 but also resulted in serious problems when RAPP-2 was commissioned

In spite of all these constraints, in 1979 RAPP-1 was operated at a capacity factor of 65 per cent and an operating factor of 82 5 per cent (Capacity factor is actual power output as a percentage of theoretical output and operational factor is actual operating hours as a percentage of total available operating hours) In that year the production of power from the first unit was around 5 700 kWh per installed kW which is 40 per cent higher than the national average from the coal-based thermal plants

Leaking tubes

In 1980 RAPP-1 suffered two outages due to failure of tubes in the heat exchangers that cool the heavy water. The heat exchangers had to be taken out, the leaky tubes identified and plugged. This failure was not initially expected by the designers of the reactor. But it has been the international experience that, even if the heat exchangers are supplied as per standards and specifications, tube failures can be expected after a few years of service due to normal corrosion and wear.

The RAPP authorities have now instituted a regular in-service, non-destructive inspection system of heat exchanger tubes. The leaking tubes or tubes that have become critically thin are identified and plugged.

Towards the end of 1980 there was a malfunction of a control system in RAPP-1 which led to a reactor trip and the initiation of an automatic safety procedure whereby the reactor and auxiliary equipment was doused by water from a tank located near the ceiling of the reactor building. This was something like a false fire alarm resulting in an automatic but needless water quench. As a consequence the reactor had to be again shut down until the mess was cleared up.

Despite the above outages, in 1980 RAPP-1 operated at a capacity factor of 54 per cent, an operational factor of 74 per cent and a production average of 4,750 kWh per installed kW, still better than the national average for coal-based thermal power plants.

In 1981, however, RAPP-1 suffered a severe and unexpected setback when there was cooling water leakage in the endshield. The endshield of the RAPP-1 reactor is a massive, water cooled carbon steel cap, weighing 125 tonnes, which acts as a radiation shield. There are two endshields, one for each end of the reactor. The RAPP-1 endshield was finish fabricated at BHEL, Bhopal, from parts imported from Canada.

It must be emphasised here that the coolant in the endshield is ordinary water. There was no leakage of heavy water, which is in the reactor proper. Nor, according to Dr. Srinivasan, was there any dangerously high radioactivity in the coolant water leaking from the endshield. All the water leaking from the endshield was contained within the reactor building itself.

Sealing operation

In an ingenious operation, the RAPP authorities have managed to plug the leaks by circulating through the endshield cooling system a combination of sealing chemicals. The sealing operation, which commenced on November 24, was expected to be completed by December 25 and the reactor brought back into operation by the year end.

Earlier, the leaks were located *in situ* by sophisticated methods such as acoustic emission and helium leak detection. Making the best of a bad bargain, the RAPP authorities have combined this forced outage with the biannual maintenance shutdown of 10 weeks which they would have had to take anyhow.

Although the PPED, which Dr. Srinivasan heads, has not heard of any leakage in endshields of similar reactors in Canada, it is not taking any chances and the manufacturing methods of endshields, as well as the material specifications, have been accordingly changed.

In fact, for the second reactor of the Madras Atomic Power Project, the endshield envelope will be of stainless steel. (Such technological improvements based on operating experience are an international practice known in nuclear power circles as "backfitting".)

Because of the endshield problem, the performance of RAPP-1 in 1981 was poor, with a capacity factor of only 31.4 per cent, an operation factor of 51 per cent and energy production of 2,740 kWh per installed kW.

The second unit of RAPP became critical in October 1980 and was synchronised with the grid in November. It was, however, declared to be operating commercially from April 1981. The performance of the reactor has been satisfactory, though the figures (capacity factor 43 per cent, operation factor 79 per cent and energy output 3,760 kWh/kW) appear to belie that.

Low capacity factor

The low capacity factor is due to the fact that two of the heat exchangers for cooling the heavy water have a large number of their tubes plugged. The reactor has, therefore, been downgraded to 60 per cent of its rated capacity.

How were the two heat exchangers damaged? It was not, as some press reports speculate, due to any fault at the manufacturers' end. According to Dr. Srinivasan, the genesis of the damage can be traced back to the strike of 1977-78. During this period the officers who were testing these heat exchangers were pulled out to work on RAPP-1 since the operators went on strike.

It is surmised that the test water in the tubes of the heat exchangers, instead of being drained out, was left in them. This stagnant water led to bio-corrosion of the cupro-nickel tubes and to prevent their leakage they have had to be plugged.

The two new heat exchangers are ready but they cannot be fitted immediately since the reactor cannot be taken out this being the season of peak power demand. The programme is to replace the heat exchangers when the reactor is taken out for its annual maintenance six week long outage in March/April next year.

Candu type reactors

The chequered history of the RAPP reactors may raise doubts about the choice of the Candu type of heavy water reactors for our atomic power programmes. But the fact is that among the best performing reactors of the world, with capacity utilisation averaging 80 per cent and above, at least half are the Candu type.

Actually, in most developed countries, the average capacity utilisation of nuclear power reactors is 60 to 70 per cent. If our nuclear power reactors give an average utilisation of 65 per cent, they will be more competitive in cost of power generation than coal based thermal power stations.

It is true that the capital needed for the Narora atomic power project in U.P. is slated to be around Rs. 7,500 to 8,000 per installed kW, which is more than the Rs. 5,000 per installed kW needed for the coal based superthermal power stations. But then, the fuelling and heavy water cost for a Candu type nuclear power station comes to only five paise per unit, against 20 paise per unit for coal-based thermal power stations.

No doubt, there will be many who might question the wisdom of going in for nuclear power stations basing their fears on the performance of RAPP-1. But it has to be remembered that it was the first and was developed at a time when the technology was young. Then again, our coal stocks, though large, are of poor quality.

Moving large amounts of coal is itself a gigantic problem. For bulk power, there is no alternative to going nuclear especially for places distant from coal deposits. The alternative energy sources can at best be supplementary and suited for distributed small consumers.

India has a programme to install 10,000 MWe of nuclear power by the end of this century. This will consist of 10 reactors of 235 MWe and 12 reactors of 500 MWe. This capacity is in addition to that already slated for Narora and Kalpakkam.

Gestation period

The gestation period for a nuclear power station in India today is around 10 years. For the Kankrapara unit in Gujarat, the latest station sanctioned, the schedule is 9.5 years for the first unit and another year for the second unit.

According to Dr. Srinivasan, this gestation period can be reduced to 8.5 plus one if the designs are standardised, imports procured in bulk and the orders to the suppliers bunched. But this requires the commitment to a significant number of reactors at the same time by the Government. The one-by-one approach will only mean delays and rising costs.

Fears have also been expressed about the problem of disposal of radioactive wastes from nuclear reactors. According to Dr. Srinivasan, processes are now available for converting voluminous highly radioactive wastes into small volume solids which can be tucked away underground without occupying much space.

Over the last two decades a tremendous strength in designing, manufacturing and running nuclear power plants has been developed. This expertise has been acquired not only by the Atomic Energy Commission but also the Indian engineering industry. It would be folly to throw all this away just because of some initial setbacks in the first plant. The worth of a whole programme cannot be judged by the performance of a single unit.

CSO: 5100/7044

NUCLEAR EQUIPMENT NOT BEING PROPERLY MAINTAINED

Kuala Lumpur BUSINESS TIMES in English 20 Nov 81 p 2

[Text]

NUCLEAR instrumentation in various Malaysian institutions are not being properly used or maintained.

Encik Razali Hamzah, an official of Puspati, the national nuclear research centre in Bangi, said the problems included lack of skilled staff, unavailability of spare parts and data books, organisation structure and environmental conditions.

Presenting a paper at the seminar on nuclear energy for industry, Encik Razali said the institutions which use nuclear instrumentation include the General Hospital, Universiti Pertanian, University of Malaya and Universiti Kebangsaan.

A survey conducted by Puspati in 1979 found that most of the institutions either had no proper division looking after the instrumentation or had very poor services.

The lack of an adequate budget allocation for maintenance indicated that the management has not placed enough emphasis on the need to take care of the performance and use of the instrumentation.

This could have serious consequences. Research work could be interrupted and patients' lives could be jeopardised by breakdowns of medical instrumentation.

The survey noted that maintenance staff tended to be recent school leavers or other people not familiar with instrumentation repair. Qualified personnel usually left for better paying jobs in the private sector, he noted.

The survey also found that users of nuclear equipment were unaware of its reliability and performance before they purchased it.

After sales service from local agents were either poor or non-existent. Most of the agents lacked workshop facilities and maintenance staff. It was believed tha foreign manufacturers and the agents were not motivated to give these services due to the relatively low sales volume here.

Encik Razali said Puspati was making plans to tackle these problems at two levels.

First it proposed to attack the immediate problems of maintenance by training more staff in maintaining, servicing and testing equipment. It was also looking at ways of getting supplies of components faster.

Secondly, as a long term target, Puspati was studying the ways of building up manufacturing capability of nuclear instrumentation in the country.

Engineers and scientists at Puspati would have to be trained in designing and making common as well as sophisticated instrumentation.

Encik Razali said the best solution would be to create a national instrumentation centre.

In fact Puspati has established a division to cater for the nuclear instrumentation problems but its services were currently limited to nearby institutions in Kuala Lumpur. The major complex was still under construction.

CSO: 5100/8102

BRIEFS

NUCLEAR ENERGY CONFERENCE SCHEDULED--Port of Spain, Trinidad, 29 Dec (CANA)--Guyana, Venezuela, and Cuba have been instrumental in getting the United Nations General Assembly to decide on holding a big conference on nuclear energy, according to a statement from the U.S. Information Centre here. The three were among 26 countries which sponsored a resolution calling for the convening of a conference for the promotion of international cooperation in the peaceful uses of nuclear energy. Other sponsors included Argentina, Bangladesh, Chile, Colombia, Ecuador, Egypt, Ghana, Indonesia, Mali, Mexico, Morocco, Nigeria, Pakistan and Peru. The conference will be held in Geneva from 20 August to 9 September 1983. [Text] [FL291227 Bridgetown CANA in English 0930 GMT 29 Dec 81]

CSO: 5100/2076

BRIEFS

NUCLEBRAS BUDGET ALLOCATIONS--Thirty-two percent of the 192.7 billion cruzeiros in this year's NUCLEBRAS budget will be spent abroad through loans for the purchase of equipment. That percentage represents 63.5 billion cruzeiros. Another 38 billion cruzeiros will go to servicing the foreign debt, which currently stands at $600 million. The nuclear plants in Sao Paulo (Iguape) will be allocated 12 billion cruzeiros; and Angra 2 and 3, 86.7 billion cruzeiros. Of the sum allocated to Angra, more than 50 billion cruzeiros will be spent in equipment purchases abroad. The 1982 investment budget has been increased by 8 percent in real term over last year's 95 billion cruzeiro budget. In the construction of four nuclear plants--of which only the construction of the infrastructure for one has been started--98.7 billion cruzeiros will be spent. To the fuel cycle--with the installation of several units ranging from the production of uranium concentrates to the manufacture of fuel elements--48.7 billion will be allocated. This is the second largest investment following that in the nuclear plants. The third largest allocation will go to service the company's debt. Personnel training and technological infrastructure are budgeted with 9.7 billion; mineral prospecting and research with 3.6 billion. [Text] [PY210207 Sao Paulo FOLHA DE SAO PAULO in Portuguese 6 Jan 82 p 18]

NUCLEP CAPITAL STOCK INCREASED--A decree signed by President Figueiredo has authorized raising the ceiling on the capital stock of NUCLEP [Nuclebras Heavy Equipment, Inc], a subsidiary of NUCLEBRAS. Capital stock will rise from 2,198,011,807 cruzeiros to 8,225,000,000 cruzeiros. [Text] [PY110151 Brasilia Domestic Service in Portuguese 2200 GMT 8 Jan 82 PY]

CSO: 5100/2078

BRIEFS

URANIUM MINE THEFT--Windhoek--Police in Windhoek were holding four men in connection with the theft of a small quantity of uranium oxide from the Rossing uranium mine near Swakopmund, the District Commandant of the Windhoek CID, Chief Superintendent Alan Collins, said yesterday. About three kg had been seized by police and it was thought the highly toxic black powder had been stolen in small amounts from the processing plant at Rossing. "It appears the uranium oxide is being collected and offered for sale on a non-existent market." There was little danger of radio-activity from the substance, but it was "particularly poisonous", Chief Superintendent Collins said. Uranium oxide is the final product from the Rossing mine and needs further processing before it provides fuel for nuclear power stations. Rossing's public relations officer, Mr Clive Algar, said in Windhoek yesterday it was possible that some uranium oxide--perhaps a teaspoonful at a time--was being smuggled out of the mine. "But the oxide is of such low radio-activity that a small amount would not register on a geiger counter" and would be difficult to detect. Strict security made it impossible for large quantities to be removed, Mr Algar said. [Text] [Johannesburg THE CITIZEN in English 22 Dec 81 p 12]

CSO: 5100/5613

KOEBERG: SOUTH AFRICA SENDS ENRICHED URANIUM TO FRANCE

Johannesburg THE CITIZEN in English 19 Dec 81 p 3

[Text] **PARIS. — South Africa has supplied enriched uranium to be turned into fuel elements in France for the first French-built South African nuclear power reactor, French company officials said yesterday.**

The fuel elements will be used to start up South Africa's first nuclear power station at Koeberg, near Cape Town, 12 months from now.

Framatome, leader of a French consortium building the station, said the plant had undergone successrful circuit pressure tests and should go into industrial production in December, 1982.

"The South African Electricity Supply Commission (ESCOM) has sent us a first consignment of enriched uranium which we are turning into fuel elements in accordance with our contract," Framatome's Director-General, Mr Jean-Claude Leny said.

"How South Africa obtained that uranium is none of our concern." But he added that the French Government had given Framatome permission to process it, indicating the uranium had been brought through a regular trading company and was covered by the Vienna-based International Atomic Energy Agency.

South Africa turned to the international market in 1978 when the US Administration banned the export of enriched uranium until Pretoria signed the nuclear non-proliferation treaty.

According to French industrialists, South Africa must have paid around R80-million for the 75 tons of enriched uranium needed for conversion into fuel elements for the plant.

Mr Leny declined to comment on French Press reports that the enriched uranium for Koeberg could have come from the Eurodif gas diffusion plant, in the Rhone valley of central France.

Eurodif was built as a five-nation venture, using French technology, but with each country owning a share of the plant and taking a similar share of its output.

The original shares were: France 42 percent, Italy 25 percent, Belgium 11,11 per cent, Spain 11,11 per cent and Iran 10,78 per cent.

Shareholders are allowed to sell surplus enriched uranium under international controls and guarantees that it will only be used as fuel in nuclear power stations and not for military purposes, Eurodif officials said.

The uranium is enriched at only 3 per cent and is thus not of weapons grade, one official added.

Loading of the nuclear fuels at the R88-million station should begin next September. The reactor is expected to go "critical" shortly afterwards and start generating electricity before the end of 1982, Mr Leny said.

Construction of the first unit, which began in 1976, was on schedule. Work on the second unit, due to go into production at the end of 1983, was ahead of schedule.

CSO: 5100/5612

WASTE DISPOSAL SEEN AS OBSTACLE TO NUCLEAR PROGRAM

Duesseldorf WIRTSCHAFTSWOCHE in German 20 Nov 81 p 26

[Article: "No Less Than a Provocation"]

[Text] Predictions of consumption by 1995, upon which the FRG's energy program is based, are already being called into question. Problems of nuclear waste disposal are still unresolved.

The mathematical jugglers of the institutes participating in the third projection of the FRG's energy program are optimistic. By 1995, nuclear power, as a percentage of primary energy use in the FRG, is expected to increase four-fold from its present 4 percent. Such at least is seen as a possibility by scientists at the German Institute for Economic Research in Berlin, the Institute for Energy Economics in Cologne and the Rhineland-Westphalian Institute for Economic Research in Essen. To attain that goal one to two large-scale power installations of the Biblis type will have to be put on line each year.

Yet what the scientists consider as being within the realm of possibility lacks, according to the SPD's energy expert, Ulrich Steger, "substance in reality." The chairman of the SPD parliamentary caucus sees the statistical projection as "no less than a provocation." There are still too many unanswered questions concerning the future role of nuclear power. Says Steger, "the threat to nuclear power does not come just from citizens' initiatives, but also from the question of nuclear waste disposal." Because the Nuclear Power Law has, since 1976, been amended by a provision that only permits the construction and operation of nuclear power stations after the question of waste disposal has been dealt with. Nonetheless, this exists only on paper in the FRG.

At the moment there is only the prototype of a recycling plant at the nuclear research center at Karlsruhe. The quick breeder, which is to be supplied with plutonium from recycling installations can, in any event, only produce current in the next century as a demonstration project. Interim storage is still controversial since the fuels can only be put in interim storage if a permanent storage depot exists. And a permanent storage depot for nuclear waste still does not exist in the FRG.

For the chairman of the German Society for Recylcing of Nuclear Fuel (DWK), Guenther H. Scheuten, recycling in the FRG is already at the "state of the art." For many nuclear opponents such statements are little more than empty cliches.

To be sure, recycling in Europe (France and Great Britain) is already in large-scale operation, but these installations are no yardstick for the state of the art in Germany. The construction of such a plant as the French La Hague would be unthinkable in the Federal Republic if only because of the higher security demands. And the British installation at Windscale is still unable to process fuel rods from German light water reactors. The prototype of the German recycling installation at Karlsuhe has been operating until now without significant problems, yet whether a large-scale installation would be feasible remains to be proven.

What is planned, however, is not a large-scale plant but instead, one with an estimated annual capacity of 350 tons. The DWK is also planning an additional 700 ton annual capacity plant in the Bavarian town of Schwandorf.

If the levels of electrical current production predicted by the three research institutes should actually come to pass, there are still only vague projections of what should be done with the highly readioactive nuclear wastes. DWK head Scheuten calculated, "with an on-line capacity of approximately 35,000 megawatts some 12,000 to 14,000 tons of exhausted fuel rods would be produced by the year 2000, of which some 2000 to 2300 tons would go to France. And that is calculated according to present conditions until 1985. By 1993/94 we hope to be able to recycle some 2500 tons of fuel elements in German installations. For the remaining 9,000 to 10,000 tons other disposal possibilities will have to be found."

Yet the location of the 350-ton-capacity plant is still not certain. Granted that the states of Bavaria, Rhineland-Palatinate and Hesse want to propose locations for the plant, still they cannot escape difficulties with local populations in the course of planning. Thus the DWK had to abandon a site at Wethen in Hesse because, as Scheuten stated, "sudden earthquakes can occur overnight."

The question of interim and permanent storage have still not been resolved. Thus exhausted fuel elements that are not destined to be shipped to France for recycling, are stored in the decay tanks of German nuclear power plants. But not all nuclear plants are set up for such compact storage. In most nuclear power plants such capacities are adequate for hardly more than a few years. For this reason other interim and permanent storage capacities have to be found as soon as possible, as for example at the salt deposits at Gorleben. Yet whether Gorleben is suitable for terminal storage of the hot materials is questioned by many scientists. Even DWK head Scheuten expressed himself very cautiously in this regard, "the last word, whether disposal of highly radioactive wastes in Gorleben will be possible can only come after the salt deposits have been thoroughly studied by mining experts. We are counting on the results of their studies in 2 to 3 years."

9878
CSO: 5100/2067

NEW WASTE DISPOSAL PROCESS DEVELOPED

Duesseldorf HANDELSBLATT in German 27/28 Nov 81 p 22

[Article: "Nuclear Research Station Juelich: Nuclear Wastes To Be Incinerated"]

[Text] An incineration process, by which weakly radioactive wastes can be reduced to as little as one-fiftieth of volume, depending upon the materials so treated, has been developed and is ready for production at the Juelich Nuclear Research Station. Two to three such installations would suffice to reduce substantially the volume of low-level and non-radioactive wastes from the dozen or more nuclear energy plants in West Germany. Until now, the weakly radioactive wastes from nuclear power plants and radioactive wastes from medical and research operations have been placed in interim storage drums without substantial reduction in volume. An initial plant for nuclear waste treatment along the lines of the "Juelich Incineration System," which would of course have to be further processed for permanent storage, is being planned for the Union AG power plant near Frankfurt. Since approval for storage of nuclear wastes at the so-called experimental storage depot Asse II had run out in 1979, storage capacities at power plants are slowly reaching their limits. Using the Juelich process, plastics, rubber, infected medical wastes or animal cadavers can be incinerated. At the plant the wastes will first be broken down to gases and carbon and then incinerated. The incineration gases will be run through several filter stages and will comply, with respect to their chemical composition, with the standards of the new Technical Guidelines (TA) for air. With respect to radioactive emissions, the staff at Juelich is convinced that they will be able to meet the standards of the Radiation Ordinance and local regulations. The installation is ready for official approval.

It is proposed in further development stages to be able to exploit the gases produced in the thermal preparation for heat or power purposes, instead of allowing them simply to be burned off.

9878
CSO: 5100/2067

DECREE ON CREATION OF HIGHER COUNCIL FOR NUCLEAR SAFETY

Paris CEA NOTES D'INFORMATION in French Nov 81 p 16

/Decree No 81-978 of 29 Oct 1981 on creation of a Higher Council for Nuclear Safety, signed by Prime Minister Pierre Mauroy and Minister of Industry Pierre Dreyfus7

/Text7 The prime minister,

regarding the report of the minister of industry,

In view of Decree No 73-278 of 13 March 1973, amended by Decree No 77-623 of 6 June 1977, about the establishment of a Higher Council for Nuclear Safety and a central department for the safety of nuclear installations.

Decrees:

Article I--Article I of the decree referred to above is superseded by the following provisions:

Article I

A Higher Council of Nuclear Safety is created, attached to the Ministry of Industry.

This council has jurisdiction in all subjects involving the safety of nuclear installations, defined as all the technical regulations enforced in the construction stage and then from the start of operations to assure reliable operation, prevent accidents and limit their effects.

It forwards to the minister of industry all recommendations which it considers advisable for improving the effectiveness of the overall operations in this field.

It can be consulted by the minister of industry about all important questions involving nuclear safety, as well as about the scientific and technical quality of the measures envisaged to keep people well informed in this field.

In addition, the National Assembly, the Senate, the regional or general councils involved or, if necessary, the specialized committees set up by them can request the minister of industry to submit for the council's consideration all important questions regarding these subjects.

The council evaluates the overall results of efforts in the field of nuclear safety and sends an annual report on its activities to the minister of industry.

Article 2--Article 2 of the decree referred to above is superseded by the following provisions.

Article 2

Besides its president, the Higher Council for Nuclear Safety includes:

The high commissioner for atomic energy, vice president;

A member of the National Assembly;

A member of the Senate;

Twelve persons selected because of their scientific, technical, economic or social qualifications;

The general manager of the French Electric Company or his representative;

Six members of representative trade unions;

Three representatives of associations whose purpose is to protect nature and the environment, appointed on the recommendation of the High Committee for the Environment;

The councillor of state, chairman of the Interministerial Committee for Basic Nuclear Installations;

The secretary general of the Interministerial Committee of Nuclear Safety;

The director of civilian safety in the Ministry of the Interior and Decentralization;

The director of the general delegation for scientific and technical research in the Ministry of Research and Technology;

The director general of energy and raw materials in the Ministry of Industry;

The director of industrial quality and safety in the Ministry of Industry;

The director of gas, electricity and coal in the Ministry of Industry;

The director of the central department for protection against ionizing radiation in the Ministry of Health;

The director for the prevention of pollution in the Ministry of the Environment.

The central director for protection and safety in the Atomic Energy Commission, as well as the chief of the central department for safety of nuclear installations attend meetings of the Higher Council of Nuclear Safety;

Article 3--Article 3 of the decree referred to above is superseded by the following provisions:

Article 3

The president and the members of the Higher Council of Nuclear Safety, except persons with indicated functions, are appointed by decree of the minister of industry for a maximum of 5 years, which is renewable.

Article 4--Article 4 of the decree referred to above is superseded by the following provisions.

Article 4

The Higher Council of Nuclear Safety organizes, if it considers it advisable or on the request of the minister of industry, specialized working groups assigned to study more closely certain important scientific or technical questions on the subject of nuclear safety or to encourage inquiry on some subjects involving this field. These working groups are made up of persons, appointed by this council, or in urgent cases by its president, on the basis of their qualifications on the subject involved. These persons can be selected outside of the Higher Council of Nuclear Safety.

The Minister of Industry is responsible for carrying out the present decree, which will be published in the Official Journal of the French Republic.

issued in Paris, 29 October 1981

Pierre Mauroy

By the prime minister:

The Minister of Industry,

Pierre Dreyfus

(Official Journal
of 31 Oct 1981)

8490
CSO: 5100/2066

MURUROA TEST SITE CALLED 'RADIOACTIVE SWISS CHEESE'

Paris LE POINT in French 14 Dec 81 p 55

/Article by Roland Mihail: "Mururoa: The Volcano is losing its footing"/

/Text/ A series of controversies have arisen about Mururoa Atoll. While the prime minister of New Zealand, Robert Muldoon has just announced the official filing of a request for an inquiry with the French government and a sailing ship of the Green Peace Environmental Organization, with Brice Lalonde on board, approaches the archipelago, now on their part, CFDT /French Democratic Confederation of Labor/ engineers of the AEC /Atomic Energy Commission/, observe more and more alarming reports about the safety of the Pacific Nuclear Test Center. Their findings are startling: The atoll could be about to become a genuine "radioactive swiss cheese."

That is an old story. Previously, in August 1979, the CFDT, the majority union among the civilian personnel in Mururoa, reported that the atoll had experienced two accidents, within a few days, which the French authorities then called "incidents." A scientific inquiry commission had, moreover, afterwards recognized that the mini-tidal wave which had submerged some of the center's installations on 25 July 1979 had indeed been caused by an underwater collapse following an underground explosion which failed--with the bomb being wedged in its lowering shaft. Likewise, these authorities had also admitted at the time that an explosion in an experimental bunker had caused the death of two men and burned six other technicians.

Last October, the CFDT continued and signed. Violent storms in March 1981 reportedly removed in the very contaminated areas of the atoll, those where the outdoor firings formerly took place, large areas of bitumen intended to fix plutonium in the soil. The report is definite. It will even be confirmed Tuesday on the rostrum of the National Assembly by the Minister of Defense himself who, contrary to the union, will swear, cross my heart, that no trace of contamination of the water has been observed until now.

But there is something more serious. Still according to the CFDT, the successive underground firings--six, it is reported since Francois Mitterrand took over the government--allegedly caused a collapse of the atoll of 2 centimeters for each explosion and that since the beginning of underground tests in 1975.

Of course, in the Ministry of Defense--with the minister being strangely silent on this point--it is assured there is no serious risk there. But, is this so certain? LE POINT can assert unequivocally today, in any case, that Mururoa is actually sinking and in an alarming manner. The most authoritative AEC experts have even confirmed "a sinking of a meter in the vertical direction of each firing" of the coral reefs surmounting the basalt of the old volcano, whose summit forms Mururoa atoll. "These successive shocks" cause landslides "amounting to 100 million cubic meters of earth: real "piston strokes" which can lead on the return to waves of "5 to 6 meters," mini-tidal waves capable there also of tearing away the plutonium from its matrix of bitumen.

Moreover, the phenomenon is so alarming that the AEC administration of military applications has considered here and now "a change of methods" on the subject of nuclear firing (which obviously would be more expensive). It may even involve a possible change of location to be able to continue to test the French "bomb."

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PRIME MINISTER: SWEDEN SHOULD NOT ENRICH URANIUM FUEL

Stockholm SVENSKA DAGBLADET in Swedish 13 Dec 81 p 6

/Article by Claes-Goran Kjellander and Willy Silberstein: "'We Should Refrain From Reprocessing'"/

/Text/ "There is increasing argument that Sweden should refrain from reprocessing spent nuclear fuel and instead concentrate on safe direct final storage.

This is what Prime Minister Thorbjorn Falldin says in a SVENSKA DAGBLADET interview. He is worried about reports that the United States has begun to use spent fuel for the production of nuclear weapons.

"Today, I see no safe solution for us," he says.

And the conclusion of this must therefore be that Sweden should keep its waste within its own borders.

"For my part, I'm not surprised," Thorbjorn Falldin says. "I have often warned against the connection between spent fuel and the production of nuclear weapons. Unfortunately, much indicates that I will be proved right."

Genuine Skepticism

The technical problems at Ringhals, where radioactive water leaks out to the wrong part of the reactor, are also regarded by Thorbjorn Falldin as a sign that the skepticism attitude toward Alternative 3 before the nuclear power referendum was justified:

"If one were to believe everything said at that time about the almost invulnerable technology of the Swedish nuclear power plants, an event like this would not be possible."

"What has happened shows how important it is that Sweden should abolish nuclear power as soon as possible."

Prime Minister Falldin has noted that now there are no longer any divided opinions within the Nuclear Inspection Agency. The SKI /National Nuclear Inspection Agency/ has sounded the alarm internationally and spoken out in completely plain language.

"What we are now experiencing at Ringhals is also well in accordance with the criticism for sloppiness and lack of precision leveled by the new head of the nuclear power agency in the United States against plant builders in the United States."

The risk of spreading nuclear weapons to more nations is now increasing as a direct result of the technical development. More and more nations are acquiring the knowledge necessary for manufacturing nuclear weapons.

"All of the decisive responsibility rests with the superpowers, however," Thorbjorn Falldin believes. "Only if they realize that one cannot constantly raise the level of the terror balance will one be able to control the arming."

"This requires that the superpowers have confidence in one another, and that control over the disarmament becomes effective."

The submarine intermezzo does not lack importance -- it provided us with information about how terrifyingly close to our territory the nuclear weapons exist. But Thorbjorn Falldin refuses, despite all, to draw the conclusion that all Soviet submarines are equipped with nuclear warheads.

"That would be horrible. It would mean that from the beginning the decision had been made that an armed conflict would lead to nuclear war."

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PAPER URGES CONTINUED STUDY ON SPENT FUEL ALTERNATIVES

Stockholm SVENSKA DAGBLADET in Swedish 15 Dec 81 p 2

/Editorial: "Falldin's Worry"/

/Text/ In a SVENSKA DAGBLADET interview last Sunday, Prime Minister Falldin took up the question of dealing with the waste from nuclear power.

For we cannot escape it. Swedish reactors produce waste, and the waste must be taken care of. Moreover, the problem would have existed even if Alternative 3 had won in the popular referendum. One cannot do away with the waste by magic -- not even waste from six reactors used for only 10 years after 1980.

It is good that this insight has now gained a foothold among nuclear power opponents.

As is known, there are two alternative ways of dealing with the spent fuel. It can be preserved directly, after a few years' storage. It can be reprocessed, which makes it possible to recover a certain amount and results in better economy and less volume of waste for final storage.

In Sweden both methods have been analyzed and planned in detail. According to the law of conditions, the nuclear power companies had to prove that they were able to arrange final storage in either manner. This led to the so-called KBS /Nuclear Power Safety/ Projects I and II. The reactors which were started up in accordance with the law of conditions -- that is to say after number six -- did so by invoking KBS I, that is to say the reprocessing alternative.

Consequently, plans are for the waste from Swedish reactors to be reprocessed before final storage.

However, in Sunday's interview the prime minister expressed great doubts about reprocessing and instead advocated so-called direct storage.

Falldin refers to the connection with nuclear weapons. (Poor) nuclear bombs can be made from plutonium extracted from reprocessed nuclear fuel. To be sure, this was already known. But Falldin is worried about reports from the United States that one has begun to use the reprocessed fuel to produce nuclear weapons.

To this might be said that the decisive criteria for whether Sweden should begin making nuclear weapons are made up of entirely different considerations, namely, primarily, the political decision. Sweden has signed the nuclear non-proliferation treaty.

Should Sweden at some point get a political leadership which wishes to force through a Swedish betrayal of this international obligation, one would in all certainty not take a detour through nuclear fuel in order to make nuclear weapons. For a nation which is sufficiently advanced technically (and Sweden is such a nation) these can be produced in a much cheaper and more efficient manner, that is to say through production with a direct military focus from the beginning.

The world has now progressed so far that neither the supply of knowledge nor the supply of raw materials limit the manufacture of nuclear weapons. The nuclear weapons issue is far more political than technical.

Swedish nuclear waste sealed in bedrock is and remains rather insignificant in comparison with the world's resources of ready-made nuclear weapons and first-rate nuclear explosives.

We probably still have the possibility of weighing, quite unemotionally, the technical and economic pros and cons of the two principal methods of storing spent nuclear fuel.

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BRIEFS

MORE IODIDE TABLETS DISTRIBUTED--On Monday the National Health and Social Welfare Board began mailing out iodide tablets to all households within the so-called preparedness zones around the nuclear power plants of Barseback, Oskarshamn, Forsmark and Ringhals. Included with the 20 tablets are also instructions on how to behave in an emergency: "Measures During Alarm From the Nuclear Power Plant," the pamphlet is called, which the SSI, the Radiation Protection Institute, has included. In addition, the provincial government of the four nuclear power regions, Halland, Malmohus, Kalmar and Uppsala, have worked out local pamphlets with tips on telephone numbers, evacuation routes, signals, etc. The packages contain 2 x 10 tablets and may be stored for a limited time of 2 years, says Per Manell, head of the health division of the Health and Social Welfare Board, which is mainly responsible for mailing the iodide tablets. These are packed in Lund and are being mailed from there beginning this very week. Within a few days everyone who is supposed to have the tablets will also have received them. The tablets are mailed bulk rate. The iodide tablet distribution is a result of the parliamentary decision last year to increase preparedness for accidents at the nuclear plants. In addition to these packages of tablets, many different projects to increase safety have already been implemented at the nuclear plants. Safety is to be increased on more than 40 different points. Among other things, ventilation systems are being rebuilt, and so-called filter chambers are planned for collection of radioactive gas in case of a core meltdown. /Text/ /Stockholm SVENSKA DAGBLADET in Swedish 8 Dec 81 p 6/ 11949

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ENERGY NEEDS, NUCLEAR POLICY DEVELOPMENTS

Duesseldorf ATOMWIRTSCHAFT/ATOMTECHNIK in German Nov 81 pp 597-601

[Article by R. Hohl, Graduate Engineer, ETHZ (Federal Technical College of Zurich), technical assistant to the management of the division "electricity generation," BBC (Brown, Boveri, & Cie), CH-5401 Baden: "Situation of and Prospects for Nuclear Energy in Switzerland"]

[Text] In Switzerland, the future of its energy supply and thus that of nuclear energy depends on decisions which must be taken soon exclusively on a political level. Following the rejection of the so-called "nuclear-power initiative" by the Swiss people in February 1979 and the adoption 3 months later of the amendment to the Atomic-Energy Law, now no nuclear power plant can be constructed unless a general permission is granted and a proof of need is furnished. The Federal Energy Commission (EEK), which was set up by the Bundesrat [Executive Federal Council], published a report in February 1981 which is supposed to give the authorities criteria for making decisions on this proof of need. In its exposition, the EEK relied on two works published in 1979: The report by the Federal Commission for the Total-energy Concept "The Swiss Energy Plan," and the so-called "Ten-Company Report" of the Association of Swiss Electricity Works. Among other conclusions, both studies came to the finding that following the initial startup of Leibstadt, Switzerland's ability to meet the electricity demand by the middle of the 1990's will not be ensured with reasonable certainty without the operation of two additional 1,000-MW nuclear power plants.

Developments up to 1980

Up to now, the pluralistically organized Swiss electricity sector, with a full awareness of its responsibility, has always known how to control the growth of production capacities in such a way that neither the citizens nor the economy ever had to suffer from shortages, and yet they have been able to profit from favorable rates compared to the rest of Europe. According to some new legislation, now the responsibility for this task--which in principle is a technical-economic one--is to be assumed by the Bundesrat and the members of the Swiss parliament, at least as far as this concerns the currently most economical solution, namely nuclear power plants. And in their decisions these bodies are unlikely to be able to ignore public opinion, which is subject to manipulation. How could things have come to such a pass that the future of nuclear energy fell into the hands of the politicians in this way?

After the last world war, the electricity sector kept up with the increasing demand for electricity by energetically stepping up the expansion of water-power utilization, until at the end of the 1950's the maximum acceptable limit in terms of economy and with reference to environmental damage began to loom on the horizon. To take the place of water power, at first huge oil-fired thermal power plants were planned. With good reason, these projects met with a growing resistance from the population, which had been alerted to the emissions which could be expected, so that finally only the 280-MW oil power plant of Vouvry could be built (initial startup in 1966/67).

Therefore, the commercial breakthrough of nuclear energy was welcomed on all sides, and by conservation circles in particular. The Federal authorities as well promptly set to work, and by 1959 they had already passed the Atomic-Energy Law (accepted by the people in 1960). Among other things, this law made construction permits and safety conditions for nuclear power plants (NPP's), as well as radiological protection, quite generally an affair of the Federal Government. From 1964 on this government resolutely placed its hopes in nuclear energy--a decision which in retrospect, in light of the later petroleum-price shocks, was to prove to be economically correct as well. Practically without any resistance and after a very short construction time, the electricity sector was able to put into operation between 1969 and 1972 the NPP's of Beznau-I and II north of Baden, which were still cooled by river water, and Muehleberg west of Bern (Table 1). Other projects, now of the 1,000-MW class, were started on: Goesgen, Kaiseraugst, Leibstadt, Verbois, Graben, Inwil, and Ruethi.

Swiss industry had not remained idle. One group of companies started on its own reactor developments quite early on, building in the 1960's, with governmental assistance, the 10-MWe pilot plant of Lucens, although success remained outside its reach. Today the relevant exporting industry limits itself to the construction of important NPP components such as steam turbo-groups, steam generators, pressure vessels, measuring instruments, and so forth. Engineering companies likewise have developed a good reputation in terms of designing and assessing nuclear facilities, and these outfits profit from the neutral position of Switzerland with respect to reactor technology.

Meanwhile, a strong resistance began to take shape which was made up of frightened and in some cases also anti-industry circles of the population, especially in northwestern and western Switzerland. This resistance had been stirred up by biased reporting or even false reports by the mass media, and had been misused by extremist-political groups. As happened in the FRG and in Sweden, the nuclear-energy controversy kindled in the United States also produced effects in Switzerland. The first time matters came to a head was in 1975, with the occupation of the power-plant grounds of Kaiseraugst in the vicinity of Basel. In the aftermath of this, the rattled authorities began to delay the granting of construction permits, so that since then it has proved possible to put into operation only the NPP of Goesgen, between Olten and Aarau, at the end of 1979. Leibstadt, near the confluence of the Aare and the Rhine, is likely to be next in 1983, several years behind schedule.

For its part, the electricity sector has not remained idle in the intervening time. Thus, two groups with partnership contracts have secured themselves long-term electricity orders from the French nuclear power plants of Fessenheim B and Bugey. Furthermore, the NPP operators have concluded contracts with foreign companies on uranium procurement, enrichment, fuel fabrication, and reprocessing.

Table 1: The Nuclear Power Plants of Switzerland

Designation	Net power in MWe	Reactor type	Cooling	Official initial startup
In operation				
Beznau-I	350	PWR	Aare River	1 Jan 1970
Beznau-II	350	PWR	Aare	1 Jan 1972
Muehleberg	320	BWR	Aare	6 Nov 1972
Fessenheim B[1]	267[2]	PWR	Rhine	1977[3]
Bugey[1]	324[2]	PWR	Rhone	1977[3]
Goesgen	920	PWR	Cooling tower	19 Nov 1979
Under construction				
Leibstadt	824[2] (940)	BWR	Cooling tower	Scheduled for 1983
With a siting permit				
Kaiseraugst	600[2] (925)	BWR	Cooling tower	-
Graben	1140	BWR	Cooling tower	-
Verbois	-	-	Rhone	-

[1] NPP of the Electricite de France, with Swiss participation
[2] Swiss share, total power given in parentheses
[3] Initial electricity deliveries to Switzerland

The opposition to nuclear energy peaked with the launching of the so-called "nuclear-power initiative," which was formulated in such a way that the construction of additional NPP's would have been practically prevented. However, thanks to level-headed circles in the Bundeshaus it proved possible at the same time to prepare in defense an amendment to the 1959 Atomic-Energy Law, which met the nuclear-energy opponents halfway. Thus, on 18 February 1979 the Swiss people rejected the nuclear-power initiative, even though very narrowly (51.2 percent to 48.8 percent), and in its place 3 months later accepted the amendment to the Atomic-Energy Law. The outcome of these plebiscites is of psychological interest, in that the endorsing of nuclear energy increases with decreasing distance from the existing NPP's. In the amendment to the Atomic-Energy Law, now the compromise lies in the fact, among other things, that the decision to construct new NPP's (after Leibstadt) has become a purely political one. As is shown in the following, with this the electricity sector can no longer determine when a new nuclear generation plant should be built.

General Permission and Proof of Need

The Federal Act concerning the amendment to the Atomic-Energy Law of 1959 stipulates for NPP's, among other things, a so-called general permission. This "is to be denied or made dependent on the fulfillment of suitable stipulations or conditions, if for the energy which is to be generated in the plant no sufficient demand is expected to exist within the country. In determining the demand, possible energy-saving measures, finding substitutes for petroleum, and the development of other forms of energy are to be taken into consideration. The general permission is granted by the Bundesrat and is subject to approval by the Federal Assembly (National Council and Cantonal Council)." Worth noting is the basically negative approach of this legislation.

The Federal Act further dictates that the general permission be granted only "if there is a guarantee of the ongoing and safe disposal and ultimate storage of the radioactive wastes coming from the plant and if provisions have been made for the closure as well as the possible demolition of superannuated plants."

The Bundesrat imposed the condition even on existing NPP's that by the end of 1985 there would have to be definite, site-specific ultimate-storage projects for all categories of radioactive wastes--otherwise the NPP's were to be shut down. Neither is there any talk about the consequences associated with such an eventuality, nor are countermeasures discussed.

On the other hand, there is a stipulation which is more welcome with respect to energy policy, in that according to this regulation the general permission can also be made subject to the condition that the licensee makes it possible to have an effective utilization of the heat generated. In other words: Cogeneration, uncoupling for district-heating purposes, and possibly "cold" district heating. To be sure, in Switzerland this presupposes the expansion of the district-heating system, since today this meets only 2 percent of the heating market.

As a newly created concept, "general permission" is the prerequisite for the construction permit and operating permit, and the "proof of need" as a condition for this seems to be a makeshift concept coined by the politicians--a concept which is thought capable of helping to clarify the nuclear energy controversy. For implementing this proof of need, the Bundesrat set up the Federal Energy Commission (EEK) in October 1978. This consists of 21 members, whose composition mirrors the various currents of opinion prevalent in the field of energy policy. To the EEK, which published its report in February 1981 [1], what was important above all was to work out principles of decision-making for the attention of the authorities, so that these are put in a position to make their decision in awareness of the attendant consequences. "Within the energy sector, the future probably is not determinate--nevertheless, to some extent this future can be shaped by the energy policy," says the report. However, it concedes that "a proof of need is absolutely impossible scientifically, not capable of being settled in practice, and controversial as regards the relevant regulative policy, but nevertheless today it is necessary from the social-policy standpoint."

The EEK focused its considerations on the winter half-year (1 October to 31 March), which is critical in Switzerland. Nowadays it is within this period that 53 percent of the annual electricity need but on the average only 43 percent of the hydraulic power generation occur. In terms of this period, the EEK compared the conceivable changes in demand with the possible ways of satisfying this demand.

In doing this, it was able to rely on two well-founded studies--namely, on the scenarios of the Federal Commission for the Total-energy Concept (GEK) [2], and on the so-called Sixth Ten-Company Report of the electricity sector [3]. The latter is a forecast of conditions up to 1990, a period of consideration which suggests itself from the fact that following the decision on construction at least 10 years must pass before an NPP can deliver electricity to the power-distribution network. Both studies take into account the safeguarding of jobs (economic growth), reasonable electricity-conservation measures, and an adequate replacing of heating oil by electricity. They both conclude with the finding that following the startup of Leibstadt, there will not be a reasonable certainty that electricity needs can be met by about the middle of the 1990's without the operation of two additional 1,000-MW nuclear power plants.

In order to assess these studies in depth, the EEK calculated the possible changes in demand in light of a large number of alternative assumptions: Three variants for economic growth (all positive), two kinds of increase in energy prices, six conjectures on the growth of demand with respect to savings and substitution effects, and two measure packages. The package favored by the opponents of nuclear power has a statist character, in that 75 percent of the savings can be attributed to the banning of new electric resistance heaters and electric water heaters.

As concerns the power-generation possibilities in the winter half-year of 1989/1990 (Table 2), the starting point was the supply from the existing plants:

1. Hydroelectric power plants, assuming an average water supply (to be sure, fluctuating climatic conditions cause variations of up to ± 30 percent);

2. NPP's up to and including Leibstadt;

3. Conventionally defined thermal power plants (present share of production in the winter only 3-5 percent).

Added to these were firstly the expansion in the utilization of water power, which could be expected to be slight, and next the estimated electricity production from intermediate and small decentralized plants using cogeneration which have yet to be built.

It is here that there was a parting of ways--something which finds expression in the three EEK scenarios. EEK 1 corresponds roughly to the Ten-Company Report. EEK 2 is the extreme view of the alternative-sponsoring organizations. EEK 3, as a compromise solution, lies between these. Whereas the realistic scenario EEK 1 considers a doubling of installed capacity by plants with cogeneration to be already optimistic, the ideologically biased scenario of EEK 2 has faith in a fivefold increase (and a further fourfold increase by 2000). It expects the country, for example, to make available within 10 years in the governmental and services sectors some 3,000 to 4,000 small total-energy plants of the 100-150 kWe class, whose combustion motors are necessarily based on oil or natural gas. Even apart from their dubious economic efficiency, they increase air pollution because of their exhaust gases and they go against the demand for a decrease in oil dependence. It is exceedingly strange that environmental-protection representatives of all people are promoting such solutions. But with this "trick," together with the ban on new electrical heaters, they succeed in converting an unsatisfied electricity demand into a surplus and thus repressing the necessity for additional NPP's. The purpose of such practices is obviously of a social-policy nature. After all, the EEK was unanimously of the opinion that the EEK-2 plan cannot be realized without radical governmental interventions. By the way, it is noteworthy that even the ideologues in the EEK do not attach any consequential weight to the so-called new energies in connection with electricity generation.

Table 2: Comparison of Electricity-generating Possibilities and Demand (in GWh) in the Winter half-year of 1989/90, on the Basis of Various Studies

Study	Generation possibilities without additional high-capacity power plants					Demand as a function of the energy policy	Shortage (-) or surplus (+)
	From plants existing in 1980 1)	Generation capacity to be newly provided					
		Water power	Decentralized CG plants	Without reserves	With reserves 2)		
EEK 1	26798	588	375	27761	25350	29200	-3850
EEK 2	27004	615	1875	29494	26390 to 27570	26020 to 24770	+370 to +2800
EEK 3	26954	615	750	28319	25350	28030 to 26020	-2680 to -670
Ten-Company	27816	588	350 3)	28754	24615	27700	-3085
GEZ, Scenario II	28215	501	220	28936	ca. 24600	28100	ca. -3500

1) Including the NPP's of Beznau I/II, Muehleberg, Goesgen, Leibstadt, and the shares received from the French NPP's of Fessenheim and Bugey.

2) Here, only those variants were accepted which were picked by the three member groups of the Federal Energy Commission. By and large, they can be associated with the energy-policy alternatives EEK 1 to 3.

3) The addition of 350 GWh signifies a doubling of the supply existing in 1980 from cogeneration plants (mostly in industry). CG = cogeneration.

For the protection of the country's economic prosperity, its electricity supply must be guaranteed at all times, and for this purpose domestic reserve production capacities are needed. They serve the purpose of compensating for poor hydraulic electricity generation in the case of a bad water supply, making allowances for operational breakdowns, and covering for the uncertainty in the assessment of demand. Naturally, here as well the views within the EEK diverged. In a statistical consideration of operational breakdowns, the industry is insistent on allowing at most one occurrence every 20 years, during the entire winter half-year, of an electricity shortfall which could be covered by imports--provided that neighboring countries are in a position to do this. This necessitates a domestic operating reserve of about 13 percent [4]. In this connection, it is advantageous that a shortage in the Swiss electricity supply is not determined by the available output capacity, but by the working capacity within a winter period (volume of the seasonal storage lakes, whose drainage rate can be controlled).

On the other hand, the opponents of this view regard it as acceptable for Switzerland to be dependent on imports more frequently than this. They have the unrealistic notion that in the future it will be possible to conclude supply contracts with neighboring countries which are of such a nature that these countries would make reserves available for Switzerland whenever it called for them, but this would be at the very time (in a severe and dry winter) when great demands would be placed on their own supplies of power.

In Table 2, the possibilities thus determined for electricity generation in the winter half-year 1989/90 are recorded, compared with the range of demand variants, and contrasted with the corresponding figures of the GEK and Ten-Company reports. Finally, the hotly debated "unsatisfied demand" is shown by the difference between supply and demand--a deficiency which possibly could be covered by nuclear energy.

Combinations of all the demand and supply variants now yielded a selection spectrum of 216 possibilities. As was perforce to be expected in light of the EEK's personnel composition, opinions were sharply divided. All the same, two thirds of the members are expecting an unsatisfied demand for the winter half-year of 1989/90, corresponding to a deficiency of output capacities of up to 1,000 MWe, and for 1999/2000 a deficiency of up to 3,000 MWe. Thus, the "proof of need" has been furnished by the majority.

One third (8 members) sees a shortage of 3,850 GWh, with this group being of the opinion that this gap should be closed with nuclear power plants above all. A second third (6), which sought a compromise and anticipates smaller shortages, leaves the choice open between coal/natural gas power plants or one nuclear power plant--the latter to be preferred especially if one expects the gap to open wider in the 1990's. As already mentioned, the last third (7) on the other hand expects only electricity surpluses and no additional need for plants strictly for the generation of electricity.

Thus the ordeal of making a choice--that is, the actual deciding, which to begin with will be on the general permission for the Kaiseraugst NPP--lies once again with the Bundesrat, which arrives at its decisions as a board-type authority, and with the Federal Assembly. In any case the EEK has made it clear that only a governmental control of electricity consumption can obviate the construction of additional power plants, and the majority of Swiss people are hardly likely to be willing to accept this. This conclusion can be also expressed as follows: The decentralized energy supply system needs central steering by the State. In the projects of Kaiseraugst and Graben, both of which were granted a siting permit long ago, already more than a billion francs have been invested which after all has to be paid by the consumer ultimately. Therefore the demand is being raised in economic circles and by broad sections of the population for a clear reversal of the previous temporizing policy. The Bundesrat announced that it wanted to make a decision as soon as in the late summer of 1981.

Waste-heat and Cooling-Tower Problem

An additional aid to making a decision was furnished with the publication in July 1981 of the study "Climod" (climate modification). In a 6-year work, a federal meteorological commission came to the conclusion that the release of waste heat through the concentration of cooling towers belonging to NPP's in operation, under construction, or in planning at Leibstadt (Switzerland), Kaiseraugst (Switzerland), Wyhl (FRG), Schwoerstadt (FRG), and Fessenheim (France) will not lead to any impairment of the regional climate in the Hochrhein/Upper Rhine area. This commission had been set up in the past at the request of the "Regio basilensis," which had an anti-nuclear-energy attitude. However, its conclusions by no means correspond to the local expectations. The more disquieting result of the study is that air pollution can influence the regional climate above all. This assertion will cause people to have second thoughts if the alternative project being suggested of a 350-MW coal/natural gas power plant should be examined in earnest.

Also in July 1981, the Federal Office for Energy Economics published a new situation report about the effects on water bodies from the cooling of thermal power plants. Despite interventions by the local cantons--the river water cooling of the NPP's of Beznau and Muehleberg has not given rise to any adverse consequences since starting operations--the report essentially confirms the cooling-tower decision of 1971. At all events, a river-water/cooling tower mixed operation or a dry cooling tower are both permissible.

Facts

Table 3 gives information about the connection between economic development and energy consumption in the last 30 years. In the wake of the first oil crisis, the overall energy consumption changed roughly in parallel with the markedly slowed economic activity (gross domestic product in real-value terms). But in Switzerland the desirable disassociation is not yet in sight. In spite of the recession, the electricity consumption rose even more in 1975/80 than in the period 1950/73, and even a good deal more than all the stated predictions estimated. It seems that despite appeals to savings, the Swiss people do not believe in a possible future electricity shortage. On the contrary, already one can discern a substitution effect caused by energy prices, in that--among other things--about 20 percent of the increase in demand in the housing sector is due to new electrical heaters. Thus the principle "electricity saves on heating oil without causing economic shipwreck" [5] has been confirmed. Such findings take on their full significance in assessing the "proof of need." To be sure, these findings are deliberately ignored by the opponents of nuclear energy--on the contrary, they are intensifying their call for government prohibitions.

Thanks to a conscientious operational management, good equipment, and a responsible court order on safety, the Swiss NPP's have achieved excellent operational results so far. For many years now, Beznau I/II and Muehleberg have been on the world's list of the 12 best plants, with an operational utilization of over 80 percent. Goesgen as well has had an outstanding start. The increasing share of domestic electricity generation held by nuclear energy can be seen in Table 4. It reached more than 36 percent in the winter half-year of 1980/81, which at that time made it the leader of all states.

If generation and consumption are compared, it is discovered that even had there been no electricity exporting, in each of the last 11 winter half-years there would have been an average electricity shortfall of about 20 percent if nuclear energy had not stepped into the breach. To have switched to steady imports, fossil-fuel thermal power plants, or electricity rationing would scarcely have been possible. This situation will become even more critical in the future. By the way, Table 4 also clearly shows how electricity generation from water power markedly fluctuates from year to year (compare for example 1974/75, 1975/76, and 1976/77, with practically the same capacity).

In terms of the viewpoints of the GEK, by the year 2000 about 40 percent of the yearly electricity generation should be based on nuclear energy, but water power should still account for half. Nevertheless, in the overall energy supply of the country, any predominance of nuclear energy is out of the question. Indeed, at that time it is likely to have acquired at most a share of 15 percent at the ultimate-energy stage.

Table 3: Changes in the Ultimate Energy Consumption and the Gross Domestic Product in Switzerland Since 1950.

Average annual growth rates (% per year) per capita of the population and consumption elasticities[1]

Period	Real GNP Growth	Total Energy		Heating fuels		Motor fuels		Electricity	
		Growth	Elasticity	Growth	Elasticity	Growth	Elasticity	Growth	Elasticity
1950-1980	2.4	3.65	1.5	2.9	1.2	6.7	2.8	3.4	1.4
1950-1973[2]	3.15	4.75	1.5	4.1	1.3	8.45	2.7	3.5	1.1
1975-1980	1.25	2.2	1.75	1.35	1.1	2.75	2.2	4.05[3]	3.25

[1] The elasticity is the ratio between the average growth in energy consumption and the average growth in the real gross domestic product (GNP).

[2] Between 1973 and 1975, after the oil shock both energy consumption and the GNP decreased because of the recession; this dip is taken into account in the figures of the period 1950-1980.

[3] Winter half-year 1975/76-1980/81: 4.25 percent.

Future Energy Policy

On 21 September 1981, the Bundesrat consented to an additional nuclear power plant in the 1990's. On the other hand, it said that it is not yet in a position to conclusively deal with the application for a general permission for Kaiseraugst. Instead, it is inviting the Kaiseraugst Nuclear Power Plant AG to submit a proposal for a waiver. For its part, this company has made known the conditions under which it would be prepared to withdraw the application. In particular, it cannot see its way to assuming partial responsibility for any later electricity-consumption shortfall because of a retreat without an alternative, or to giving up its legal position without a concrete concession by the Bundesrat on the question of indemnification.

The years 1981 and 1982 are the years for setting a new course. As concerns the political resolution of the waste-disposal problem--an additional constituent of the general permission regulation--special efforts will be needed in order to put into effect the research program of the National Association for the Storage of Radioactive Wastes (Nagra), which was formed for this purpose by the outfits which generate radioactive wastes. For some time now, 12 applications to conduct exploratory borings to investigate the primary rock in the Jura region of Olten-Schaffhausen have been waiting to be approved by the Bundesrat.

Even before granting the expected general permission for the next nuclear power plant, the Bundesrat presented to parliament a communication concerning having an energy article in the Federal Constitution, because up to now the Constitution has made do without such an energy article. In this area it is asking for national jurisdiction in three respects:

1. Basic standards for the economical and efficient use of energy, with a clear separation of powers between the Federal Government and the cantons,

Table 4: Domestic Electricity Generation in Switzerland, Shares From Nuclear Power Plants

Hydro-logical year 1 Oct.-30 Sept.	Total Generation1) GWh		Generation by NPP's1) GWh		Share from NPP's1) %		Start of Operation of the NPP's
	Year	Winter half-year	Year	Winter half-year	Year	Winter half-year	
1969/70	33173	14026	1989	1089	6.0	7.8	Beznau-I
1970/71	32785	15897	1300	804	4.0	5.1	
1971/72	31300	14161	3590	1453	11.5	10.3	Beznau-II
1972/73	36538	16884	6273	3740	17.2	22.2	Muehleberg
1973/74	37248	17904	6159	3298	16.5	18.4	
1974/75	42282	18488	7373	4206	17.4	22.8	
1975/76	36111	18931	7470	4218	20.7	22.3	
1976/77	45360	19835	7646	4360	16.9	22.0	
1977/78	43374	20836	7969	4466	18.4	21.5	
1978/79	42194	19060	9379	4650	22.2	24.4	Goesgen
1979/80	49534	24589	13643 2)	7934 2)	27.6	32.3	
1980/81		22934		8331 3)		36.4 3)	
Month							Import surplus, GWh
Dec. 1978		2991		771		25.8	+426
Dec. 1979		3907		1389		35.5	-550
Dec. 1980		3690		1441		39.1	+ 36

---

1) Not including components of the Swiss participation in the French NPP's of Fessenheim and Bugey (these are covered by the statistics as a part of the imports).

2) Operational utilization 1979/80: For the whole year 80.5 percent, for the winter half-year 93.5 percent.

3) Winter half-year of 1980/81: Largest share of all states, operational utilization of 98 percent.

2. Uniform regulations concerning the energy consumption of facilities, vehicles, and equipment,

3. Promotion of the development of techniques which are conducive to the economical and efficient use of energy, the utilization of new energies, and a broad variety of energy-supply solutions.

An energy levy tied to specific purposes (recommendation by the GEK) should be dispensed with, and in its place those sources of energy which have been exempt hitherto from the sales tax should be included in this tax.

The efficiently operating energy sector, whose organization is in part completely private (petroleum, coal) and in part that of mixed ownership (electricity, natural gas), should continue to be responsible for production and distribution. Nuclear energy itself is not mentioned by name. But its importance lies in the expressions "broad variety" and "efficient."

Moreover, also in preparation is the overall revision of the 1959 Atomic-Energy Law, since the validity of the 1979 amendment is to expire at the end of 1983. A relaxing of the regulations can hardly be expected for the time being--indeed, the commission of experts which was charged in 1975 with this revision recently submitted a preliminary draft which a noted daily newspaper assessed with the headline "almost a 'no' to nuclear energy."

The discussions about the draft of a constitutional article are under way. Industry regards this as hardly necessary; on the other hand, to the environmental organizations it does not go far enough. Following deliberation in the Federal parliamentary bodies, it must be submitted to the people and cantons for a decision. The coming years will show how seriously the Swiss people take the warnings of the oil sheiks. And the future of nuclear energy will depend on this. The deciding factor is the discernment of each citizen, because a high quality of life presupposes that the nation has also in its energy sector certain infrastructures which one not only can make use of, but also has to tolerate.

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14 April 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 136

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WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

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GEOLOGIST: USSR MAY STOP ACCEPTING FINLAND'S SPENT FUEL

Helsinki HELSINGIN SANOMAT in Finnish 28 Feb 82 p 8

[Article: "Swedish Geologist Warns: Burial of Spent Nuclear Fuel in Base Rock is Dangerous"]

[Text] Since spent fuel from nuclear generating plants cannot be safely disposed of in base rock, basic corollary studies also ought to be conducted in Finland, rather than relying on the Swedish KBS (Karnbranslesakerhet) study which has proved to be deficient, according to Swedish geologist Nils-Axel Morner.

Morner, who works at Stockholm University, participated on 27 February in a nuclear waste seminar in Helsinki organized by the Suomen Luonnonsuojeluliitto (SLL) [Finland's Nature Protection League] and the Energiapoliittinen Yhdistys (EVY) [Energy Policy Association].

Morner says that the KBS study that was conducted in Sweden during 1977-78 concerning the burying of nuclear fuel wastes in base rock has been adopted in Finland, as in Sweden, as a basis for the resolving of the waste problem, although international studies have confirmed the criticisms brought forth by Morner and other experts.

"It is an outright criminal act to ignore criticism based on scientific fact. The KBS study is in fact a disheartening example of scientific corruption," is the way in which Morner criticizes the way in which that study was approved at the time in Sweden.

The Conditional Law Nullified

Morner therefore considers the adopting of the KBS study as the basic premise for the disposal of nuclear waste to be a nullification of the so-called conditional law which regulates the use of nuclear energy in Sweden, and which prescribes the observance of a completely safe technology for the final disposition of nuclear wastes.

Morner also criticizes the scientific techniques of the KBS report on grounds that only a 20-year span was used in the investigation of the movements of the earth's crust as a basis for the drawing of conclusions on a scale encompassing a million years. Also, borings were made to a depth of only 500 meters in that study to locate a suitable site for the disposition of the wastes.

He tells of base rock drillings conducted by the Soviets in the Kola Peninsula in which rock fissures with running water were noted extending to a depth of more than 10 kilometers. The base rock in Sweden and Finland is known to be in motion and to contain fissures.

Morner warns that the handling of atomic wastes that remain partially radioactive for tens of thousands of years involves unfathomable risks when caution in anticipation of the worst possible contingency must be the operating standard, and not the regard for the economic interests of the power firms as now is the case.

Fanatic Optimism

The handling of the nuclear power issues has been characterized throughout by optimism. When the Imatran Voima power firm first began generating electrical power by means of nuclear energy in Finland, the waste problem was not recognized at all, according to physics lecturer Pekka Suominen from Jyvaskyla.

He said that appearance of retractions of earlier points of view are becoming more frequent even in the publications of IAEA, the international nuclear energy organization. Present admissions include the one that recycling though a breeder reactor, some of which are under construction in France, West Germany, and the Soviet Union, is not economically productive due to the hazardous nature of that process.

Planning director Hannu Penttila of the SLL criticized the plan for a projected nuclear energy generating plant currently in preparation in the Ministry of Trade and Industry, and the recently published second partial report dealing with waste disposal prepared by the nuclear energy legislation committee.

The SLL feels that the nuclear waste cost disposal computations contain some factors that create uncertainty.

Uncertain Computations

"Experience has shown that computations about various forms of energy production can be invalid. The public at large is constantly being confused by conflicting reports about the advantage of either coal or nuclear energy. That is why computations concerning the economics of a proposition are not worth considering as the basis for decisions."

The SLL recommends instead that such factors as environmental protection, employment, and other social policy considerations be used as a basis for the making of far-reaching decisions. The SLL suspects that the cost figures for nuclear waste disposal are underrated in the report.

A statement in the second partial report prepared by the nuclear energy legislation committee of the EVY demands that the nuclear energy law currently being drafted ought to prohibit the production of nuclear wastes until such time as adequate assurance is available concerning the safety of nuclear waste disposal.

"The draft law completely avoids stating whether there generally exists any scientific and technological measures at all for the safe storage of nuclear waste. They do not exist anywhere. As matters now stand, the collecting of nuclear waste fees grants license for the production of those wastes," says researcher Raimo Lilja.

Soviet Union's Responsibility for Waste Handling

Lilja feels that Finland ought to receive assurance that the Soviet Union will continue in the future to take care of the spent nuclear fuel from the generating plants in Loviisa. Lilja demands that the agreement between the Finnish Imatran Voima firm and the Soviet enterprise be made public so that waste disposal can be brought under control at least to that degree.

"The shortcomings in the nuclear energy program of the Soviet Union and the obvious advances elsewhere in the world provide reason to wonder whether the Soviet Union will lose interest before long in handling Finnish nuclear wastes gratis," warns Lilja.

He points out also that even now no provision exists for coping with wastes that may be created by a nuclear accident. The nuclear power enterprisers ought, in the manner of the oil accident fund, to pay a fee into a nuclear accident reserve fund in the Bank of Finland, in addition to the waste disposal feel, because insurance coverages do not provide compensation for damage to the environment by a nuclear accident.

According to Lilja, the present directional trend ties the nuclear fuel situation to temporary reserves for a period longer than planned, because the developing of final long-term storage has not been possible, which in turn leads to every greater danger in respect to the decreasing temporary supply. These he feels, can, develop into greater sources of danger than even the generating plants themselves.

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CSO: 5100/2107

WASHINGTON CORRESPONDENT ON MALONE REASSIGNMENT

Madras THE HINDU in English 11 Mar 82 p 8

[Article by N. Ram]

[Text] THE exit of Mr. James Malone as the Reagan Administration's ranking operative on "non-proliferation" and international peaceful nuclear cooperation matters has been confirmed by the State Department.

Although its spokesman denied that the Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs was being forced out because of a feeling among top Administration officials that Mr. Malone had demonstrated inability or incompetence in working out a politically saleable policy for increased U.S. nuclear exports, the media here have generally not bought this explanation.

From the time of his nomination by Mr. Ronald Reagan in early 1981, Mr. Malone has had serious problems with Congress. His confirmation hearings in the Senate Foreign Relations Committee ran into rough weather, when Senator John Glenn and others sharply challenged his credentials and suitability in a sensitive job. In particular, they raised conflict of interest objections in view of the fact that he had been a legal broker for power companies in Taiwan and Japan, but had not removed himself properly from a role in shaping the Reagan Administration policy — as co-author of transition team recommendations on the subject (for a detailed summary of this unreleased document, refer to THE HINDU of April 15, 1981).

Confused position

The Congressional strikes against Mr. Malone as the State Department's senior operative on non-proliferation affairs are many, making for a very confused position. Senior Reaganite officials in the executive branch and the minority of members of Congress who believe the U.S. has gone too far in its rigid 'non-proliferation' policy fault Mr. Malone for not doing enough to reverse the Carter Administration directions and enhance the competitiveness of U.S. nuclear exports.

Those like Mr. Glenn, who can carry a clear majority probably in the Senate and certainly in the House with them, blame Mr. Malone for diluting non-proliferation concerns, as can be seen in "supply side" moves in nuclear policy favouring Japan, Brazil, Australia, Mexico, and even the apartheid regime of South Africa. This is on top of their faulting the Reagan Administration for forcing an exemption for the Pakistani regime from the Symington Amendment.

So far as India is concerned, those specialising in nuclear 'non-proliferation' affairs in Congress see the deadlocked Tarapur talks as further evidence of the Administration's inability to pursue non-proliferation interests consistently or in a coherent, businesslike manner. Well-placed congressional sources told THE HINDU that under Mr. Malone's direction, the precise details of the positions in the Indo-U.S. talks were kept away even from specialist Congressmen, with the result that Indian newspapers had to be gone through to glean the details of what happened.

For example, the non-proliferation warriors in the U.S. Congress did not know (and were not amused to learn) that in the Tarapur talks Mr. Malone had breezily announced to the Indian negotiators that the Reagan Administration had decided "not to press approval rights for reprocessing of the spent fuel." They have also frowned upon (after discovering the "informal" and secret twist in the columns of Indian newspapers) the suggestion that the U.S. might be able to help find a new external source of fuel for Tarapur within the control framework of the 1963 agreement — comparable, although only in a limited way, to the decision to permit Brazil "to obtain elsewhere the single fuel load now needed for Angra I" (Brazil's first power reactor, constructed under contract with Westinghouse) without making it an issue or invoking the penal clauses of the 1972 bilateral agreement for peaceful nuclear cooperation.

Leak of memorandum

The leak of an internal State Department memorandum authored by Mr. Malone (dated October 2, 1981) reviewing the policy changes proposed in the non-proliferation law — to transfer all NRC licensing functions to the State Department (one of the chief recommendations in the transition team report), repeal legislation barring U.S. nuclear exports as well as military and economic aid to countries found to be moving towards the production of nuclear weapons, relaxing current requirements in the U.S. nuclear export law concerning "fullscope safeguards" — fuelled the anger of the Congressional critics.

The Administration quickly retreated from the positions laid out in the memorandum, but the content of the secret document raised Congressional suspicions of Mr. Malone to new levels. In November, Mr. Glenn angrily targeted the October memorandum for giving "a new lease" to the hopes of resisters that "if they hold out a little longer, they will be able to renew trade with the U.S. without submitting to IAEA safeguards across the board." The leading Congressional expert on non-proliferation also expressed concern over the tendency to approve "pell-mell" every request from Japan, Sweden, Spain and Switzerland concerning reprocessing.

With unconscious irony (since at that time he clearly did not know of the concession on reprocessing seven months earlier in the Tarapur negotiations), Mr. Glenn asked rhetorically: "How can we discourage the export of this technology to sensitive regions, or persuade countries like India to forego reprocessing when, with every ounce of strength, it seems, we are telling the world that reprocessing makes sense and is a legitimate part of a civilian nuclear programme?"

Mr. Malone dealt-as it has turned out, perhaps one last time-with the major issues in an address submitted to a conference in San Francisco in early December. 'I want to lay to rest one possible misperception, entertained in some quarters, of the bottom line on U.S. non-proliferation policy. It is, of course, true that we intend to enhance the international competitiveness of U.S. nuclear exports by all appropriate means...It is also true that, in contrast to the uniform approach that held sway previously, our approach will be a more differentiated one...(But) it is most definitely not true...that the Reagan Administration is less concerned than its predecessors about the threat of nuclear proliferation...'

He added: 'In our bilateral discussions on matters of nuclear commerce and non-proliferation...it has been clear to our counterparts from other countries that the Reagan Administration's orientation on this critical issue extends forward the straight line of American policy concern that goes back to the beginning of the atomic age'.

He made one other interesting point. 'In contrast to the uniform approach that held sway previously, our approach will be a more differentiated one...Over the years there arose a tendency in U.S. non-proliferation and nuclear export policy to seek to treat all customers alike and to expect that the inflexible and non-discriminatory rule of law that guides our affairs at home could somehow be universally applied to regulate our decisions on nuclear exports. Of course, in the real world, it turns out that potential customers for our nuclear exports are characterised by an extreme disparity in their non-proliferation merit and run the gamut from those countries whose sense of responsibility on this issue is no less than our own to those with whom we could not consider nuclear cooperation at all.'

Mr. Malone went on, in this address, to review several 'country-related issues'-taking in Japan, Switzerland, Mexico, Brazil, Egypt, South Africa and Pakistan-but carefully left Tarapur out of his public discussion.

The only reference to India in the policy address came at the tail-end, in the following context giving it negative credit: 'In the wake of India's 1974 detonation it was understandable that the U.S. was impelled to impose strict controls on exports of sensitive nuclear materials, equipment, and technology. But...we went too far when these restrictions extended to our closest allies and industrial partners and, as a result, we began slipping in terms of our nuclear industry's ability to compete at the industrial level. This is now being changed. What has not changed is our commitment to a strict nuclear export policy when it comes to countries in unstable areas that are real proliferation risks'.

New job for Malone

The State Department spokesman has explained that Mr. Malone is being relieved of his non-proliferation responsibilities in order to allow him to concentrate on his new job as ambassador-at-large in charge of the U.S. team at the law of the seas negotiation. (Mr. Malone has been wearing two hats for some time, but the law of the sea hat in an *ad hoc* capacity. His nomination as ambassador-at-large will come up for confirmation hearings).

State Department sources say that Mr. Richard Kennedy, the former NRC commissioner who is now Under-secretary of State for Management as well as ambassadorial representative to the International Atomic Energy Agency, was given oversight responsibility for Mr. Malone's bureau several months ago. Normally, this 'seventh floor principal's' job would have gone to Mr. James Buckley, as Under-secretary of State for Security Assistance, Science and Technology, but in view of

Mr. Kennedy's interests and experience in the NRC, the oversight was quietly given to him.

With Mr. Malone's eclipse, he has apparently taken 'de facto control' of the section in the State Department which is handling non-proliferation and bilateral nuclear cooperation affairs. Mr. Kennedy, who served in the U.S. army for some 30 years, has a Harvard Business School and national security background, rather than that of a specialist in the nuclear cooperation, and non-proliferation field. He has served in the Pentagon, on the National Security Council staff and in the Nuclear Regulatory Commission, where he was a commissioner between 1975 and 1980. He formally assumed his senior State Department responsibilities a week after Mr. Reagan was sworn into office.

As was pointed out in an earlier report in THE HINDU, Mr. Kennedy is quite familiar with the Tarapur relationship, but his stance so far as India is concerned has been regarded as uncertain, wavering and dubious. Meanwhile, the search for a successor to Mr. Malone, the nuclear broker is on. The need to deal with a new man at a late stage in the painful bargaining on a framework to formalise the termination of the U.S. nuclear supply relationship with India will probably mean some more delay. It will perhaps add an element of complication. This is more so because Mr. Malone, as readers of these columns will recall, preferred to negotiate in a relatively closed environment and showed a penchant for private or personal dealings, notably with the External Affairs Ministry official, Mr. Eric Gonsalves.

CSO: 5100/7062

GANDHI TALKS TO RAJYA SABHA ON NUCLEAR POLICY

New Delhi PATRIOT in English 19 Mar 82 p 5

[Text]

THE Indian Ambassador in Vienna has handed over an aide memoire of protest to the director general of the International Atomic Energy Agency (IAEA) against his remarks in a press interview on India's "unwillingness" to sign the non-proliferation treaty (NPT), Prime Minister Indira Gandhi informed the Rajya Sabha on Thursday, report agencies.

Mrs Gandhi told Mr Shiva Chandra Jha that the Government took a very serious view of his statement that India and some other countries were unwilling to sign the treaty and also that they either have or are building facilities that they refuse to submit to agency inspection.

The Government of India had reiterated on many occasions that it would not sign the treaty as it considered this treaty to be highly discriminatory and unequal, she added.

URANIUM

She said that there had been stray feelers regarding possibility of supply of enriched uranium for the Tarapur Atomic Power Station from sources other than the US including from some private parties.

The matter had not been pursued further as India could not obtain enriched uranium for Tarapur from any other source except the US as long as the cooperation agreement of 1963 was in force, she added.

Mrs Gandhi told Mr V Gopalswamy that India was fully prepared to ensure continued operation of the Tarapur plant irrespective of fuel supplies from the US.

To a separate question by Mr G C Bhattacharya, Minister of State for Science and Technology C P N Singh said Dr Ramanna had observed that India could not wait for developments to take place in Europe first before these were adopted and adapted to this country.

The questioner had asked whether the Government's attention had been drawn to Dr Ramanna's observation to the effect that India had to wait for development to take place in foreign countries first before these were adopted in India.

CSO: 5100/7067

COMMENTATOR ON ATOMIC BOMB ACCUSATIONS

PY311859 Buenos Aires CLARIN in Spanish 17 Mar 82 pp 18-19

[Martin F. Yriart commentary: "Frictions With Washington: The Phantom of the Argentine Atomic Bomb"--passages between slantlines in boldface]

[Text] After a period of relative relaxation following the Reagan administration's coming into office, relations between Washington and Buenos Aires on nuclear matters /are hardening again/. The first signs were detected at the beginning of 1982 with a number of newspaper articles published in the United States and in Great Britain which, citing /top U.S. diplomatic and military intelligence/ sources, stated that Argentina had decided to build an atomic bomb (or that it had already built one) and that /only an intervention at the last moment by a U.S. State Department special mission prevented it from taking place/.

This is not the first time that /the Argentine nuclear bomb issue/ has been raised in an effort to thwart the nuclear development of our country. The gross information errors and the ingenuousness of arguments included in those articles raise doubts as to whether those /"top intelligence sources"/ really exist, because the Argentine nuclear plan /is well known/ among U.S. Government circles--both in the executive branch and its departments, and in congress--and a number of U.S. politicians and government officials made trips to Buenos Aires during the past few years and /visited "sensitive" nuclear installations of our country/.

But this interpretation went down the drain due to remarks made a few days ago by State Department spokesman Dean Fishcher, ratified later in Buenos Aires by Assistant Secretary of State for inter-American Affairs Thomas Enders.

On Monday 8 March, the U.S. newspaper WASHINGTON POST published an editorial entitled: "A Nuclear-Armed Latin America?" In that article, among other groundless remarks, it is said that Argentina is on its way to building nuclear weapons /(the country has committed itself internationally to the exclusive peaceful use of nuclear energy)/; that it is building an unsafeguarded heavy water reactor /(it is building two and one is already operating, all of them under safeguards of the IAEA)/, and that Argentine nuclear exports are unrestrictedly contributing to proliferation /(Argentine nuclear exports, when allowed by international organizations, are placed under the same IAEA safeguards on imports)/.

JANATA LEADER FOR INDIAN NUCLEAR CAPABILITY

New Delhi PATRIOT in English 14 Mar 82 p 7

[Text]

Janata Party leader Krishan Kant on Saturday argued for acquiring nuclear capability for India in view of Pakistan's emphasis in having their bomb and the gradual nuclear encirclement of India.

In a statement, Mr Kant said the country could not be lulled into a false sense of security, as had been sought to be done by the Government when it showed the video film which claims that Pakistan is only two-fifths on its way to the nuclear path. The implication made by the Government, he said, was that India was far ahead.

The Janata leader argued that a trap lies in these types of calculations as Pakistan does not really have to wait any length of time once that country gets the vital five per cent technology of reprocessing that had been withheld by France. In fact, Mr Kant said, though Pakistan had complained that this had been withheld, the French manufacturers contradicted President Zia-ul-Haq's statement and implied that full technology had been transferred.

The history of nuclear development in Asia was a warning to India, Mr Kant said. China had started behind India, but had soon surpassed it and now is a decade ahead in missile and weapons technology. Pakistan too started late, but has almost caught up. The 95 per cent uranium enrichment being done in Pakistan is not for power production, nor reprocessing of plutonium for fast breeders because such a programme does not exist in Pakistan. The inference is that they have a war-like use.

India, Mr Krishan Kant said risks the danger of lagging behind.

"Parliament must not allow the Government to camouflage India's nuclear weakness," the Janata leader said. "The no-war offer of Pakistan or friendly gestures of China should not cloud our vision." The arms race had been thrust on India. India could make it less costly and less-dependent on others by choosing the nuclear option, he added.

CSO: 5100/7066

LACK OF SPARE PARTS RENDERS TARAPUR UNSAFE

Bombay THE TIMES OF INDIA in English 14 Mar 82 pp 1, 9

[Article by J.N. Parimoo]

[Text] Washington, March 13--Spare parts essential to the safety of the Tarapur plant and urgently needed for its continued operation are being denied by the Reagan administration mainly for political reasons.

For nearly a year and a half, the U.S. state department and the Nuclear Regulatory Commission have been sitting on the application for a licence to allow export of the much-needed spare parts.

Persistent SOS requires of the Indian atomic energy department have fallen here on deaf ears evidently because some elements in the U.S. administration see in India's desperate need their opportunity for political arms twisting.

The nuclear power division of General Electric, the American company that built the reactors at Tarapur, has warned the state department in a letter dated November 20, 1981 that any mishap at Tarapur would be attributed to India's inability to get the American components.

Among other things the letter says: "As you know, we are troubled by the spectre of a malfunction at Tarapur which could be attributed to India's inability to obtain the needed components from General Electric and several other export licence applicants.

"Since our application is now past a year old, we urge at least a fresh review to determine whether there is some undiscovered avenue under the constraints of legislation for treating reactor component applications on a different basis than for the export of fuel for Tarapur."

The spare-parts sought by the Tarapur atomic power plant are: source range monitors and intermediate range monitors (SRMs and IRMs). These instruments are essential to the effective monitoring of the safe working of the inner core of the reactors which are otherwise inaccessible.

An American expert of the U.S. Nuclear Regulatory Commission told me today that in the United States any atomic power plant running short of such instruments or utilising old and overused monitors (as Tarapur seems to be doing currently) could be ordered to be shut down immediately.

"That is standard regulation because you cannot run the reactor if you are not sure of what is happening in the hard core. Your plant sure needs these instruments badly."

"Then why don't you send them," I asked.

"Oh boy, that is politics. This world is full of politics," he replied.

Opinion in the state department, energy department and the Nuclear Regulatory Commission is divided on the Indian application for spare-parts which was sent to the commission on November 14, 1980.

There are those who, taking a strictly legalistic view, believe that the Indian application fulfils all the three conditions necessary for issuing a licence for the export of components.

Three Conditions

The three standard conditions are IAEA safeguards should apply to the components proposed to be exported under the licence; the components proposed to be exported to India would not be used for the development of a nuclear device or for the purpose of any research for a nuclear explosive device, and the importing country will not retransfer the components to any other country.

The Tarapur plant is working already under the safeguards of the International Atomic Energy Agency (IAEA) and all the necessary assurances in this regard have already been given by the government of India.

These generic assurances were given by the government of India as early as March 1979.

From a strictly legal point of view the Nuclear Regulatory Commission should have issued the licence long ago. But there is another more influential point of view. It is more political than legal.

According to this section of opinion, Mrs Indira Gandhi's government should be pinned down to some additional assurances to safeguard--the so-called nuclear non-proliferation interests of the U.S. administration.

For the past several months the state department has mounted pressures on Delhi to secure such assurances. There are unconfirmed reports that the government of India in its desperation has already given some such assurances to signify that it has no plans in the foreseeable future to explode a nuclear device.

Even in spite of the additional assurance reportedly conveyed by India's foreign secretary Mr Eric Gonsalves to the U.S. assistant secretary of state, Mr Malone, the anti-India lobby in the Nuclear Regulatory Commission and in the state department remains unconvinced.

If the commission is pressed to take a decision on the Indian licence it may turn down the application or there may be a tie of vote in the four-member commission.

Should this happen, the matter would have to go back to the Reagan administration and may be ultimately to Congress.

In the meantime, the Tarapur plant has entered a stage of operation which experts here consider unsafe. In a letter dated November 14, 1980, the General Electric Company had told the U.S. administration that "in the light of the safety importance of these parts and their unquestionable insignificance from a proliferation standpoint, it would be most unfortunate as well as unreasonable if this export licence application were considered by the NRC or the executive branch in conjunction with the pending application for the export of fuel...."

Emphasising the importance of the spare-parts from the safety angle, a letter from the Indian atomic energy department addressed to the General Electric Company which is dated October 22, 1981 says: "The SRM detector and monitors are part of reactor safety system."

"At no time can the core be left without monitoring. The SRM detector and monitors should be on line all the time even during unit outage and when the reactors are in cold shutdown condition to ensure safety."

CSO: 5100/7065

POSSIBILITY OF COMPROMISE ON TARAPUR FUEL SEEN

Madras THE HINDU in English 9 Mar 82 p 8

[Article by N. Ram]

[Text] AFTER holding firm through three rounds of talks spread over seven months, New Delhi appears to be engaged in an exercise that amounts to backing off an uncompromising line on the Indo-U.S. nuclear relationship. It has found vacillations and the tendency to make concessions on the basic issues creeping into the phase of decisive political action.

The inconclusiveness of the recent deliberations of the parliamentary consultative committee, on the one hand, and the stretched out consultations between the two Governments, on the other, do appear, from Washington, to reflect the compromising tendency. If the outcome is a new external reliance for Tarapur fuel with attendant IAEA safeguards — brokered by the U.S. within the control framework of the 1963 agreement — it would unquestionably represent a retreat from the positions spelt out in the three rounds of talks in 1981.

The information available to THE HINDU in Washington seems to permit no other construction on the evolving situation.

Towards the end of 1981, India signalled the U.S. of an impending announcement in Parliament that, in view of the persistent non-performance and the unilateral decision by the U.S. to terminate its nuclear fuel supply relationship, the 1963 nuclear cooperation agreement with all its obligations and rights was "null and void". The decisive and, in a sense, irreversible step could have been taken only at the highest political level, but it has not materialised.

The compromise

The compromise under question concerns the very issues, the central and linked ones, on which the talks broke down: (a) The continuation of IAEA safeguards on the Tarapur reactors and spent fuel and (b) an external source of fuel supply to facilitate (a). The shape of the compromise could deflect India from the earlier Cabinet-level decision to take the mixed oxide fuel (MOX) route for Tarapur — or at least postpone its operation.

The problem flows from the insistence by the U.S., from mid-1981, that a new source of external fuel supply must simply be accepted, if only as a means of keeping IAEA safeguards in place (since there was no possibility of India accepting safeguards at Tarapur in the absence of an external supply of fuel).

Mr, James Malone, the leader of the U.S. delegation, was far from subtle on the point. He announced that the U.S. would be "flexible" in its approach and accept a "low-key" role in the new arrangement, but India's removal of IAEA safeguards at Tarapur "would have a considerable adverse impact on bilateral relations...., There was no doubt that the reaction in Congress would be sharp..... It would be better if India could give more consideration to this (the implications for Indo-U.S. relations) before coming to final conclusions".

At least New Delhi appears to have interpreted this as some kind of threat.

However, the Indian delegation held firm through the July and November rounds of talks. As Dr. H. N. Sethna, leader of the delegation, put it in the New Delhi round in July 1981: "Under Article VI of the 1963 agreement, it is clearly mentioned that India accepts safeguards only because it is limiting its resources of fuel to U.S. supplies of enriched uranium..... The safeguards are the result of the supplies of U.S. fuel..... The question of a new source of fuel for Tarapur does not arise at the moment, as we intend to run the plant with mixed oxide fuel utilising plutonium obtained from the reprocessing of the spent fuel".

Mr. Eric Gonsalves, Secretary in the External Affairs Ministry, addressed the political side of the problem on the same occasion: "We have the right to abrogate the agreement unilaterally on grounds of material breach..... There is a limit to which we can go being accommodating. Apart from pressing technical reasons, we are also answerable to our public opinion. We have exercised restraint precisely for the benefit of our relations with the U.S. If Congress chooses not to understand, it is incumbent both on the administration and on us to explain why the safeguards have been removed..... We hope the administration will play fair and use its powers to convince Congress rather than using (it) as a lever against us".

Further, he reported, "At our parliamentary consultative committee meeting there was unanimity on the point that we would not accept continuing obligations under the termination of the 1963 agreement. If India were to go in for a new source of supply, safeguards could have been considered. This is ruled out since the supplies are to be indigenous".

These positions were reiterated in the third round of talks in Washington in November 1981.

Unorthodox proposal

However, the U.S. side came up with a new twist on the eve of this round. Mr. Malone, the former nuclear broker, played (outside the official talks, and privately to Mr. Gonsalves) upon the possibility that the U.S. might be able to get someone within the European suppliers' group to send fresh fuel for Tarapur within the control framework of the 1963 agreement. Although there were earlier recommendations from Mr. Malone that India consider the Soviet Union as an alternative supplier, the supplier really favoured by Washington seemed to be France (see report in THE HINDU of November 27).

Towards the end of 1981, given the positions developed over the protracted negotiations, the possibility of pursuing this twist, or unorthodox proposal, seemed remote. American officials seemed to be expecting a "unilateral" declaration on Tarapur in the winter session of Parliament, and were certainly talking about it privately.

The statement by the Prime Minister, Mrs. Indira Gandhi, before the parliamentary consultative committee in December 1981 seems to have altered the official posture on Tarapur substantively, by setting forth two essential conditions for an approach to resolving the problem of Tarapur-

First, the decision on the 1963 agreement would have to ensure the continued operation of the power station. Secondly, it would have to be taken within the context of "the national interest and overall bilateral relations with the U.S.". The latter has been read in India, as well as in Washington, as making improbable a "unilateral" declaration of the cessation of the treaty along with its rights and obligations.

The reading has been strengthened by subsequent statements and indications in New Delhi, and also by the recent observation by the U.S Ambassador to India, Mr. Harry Barnes, to the effect that India and the U.S. are making efforts to "narrow down their differences on the supply of nuclear fuel for Tarapur". Since there seems no question of resuming the American fuel supply, this can only mean that the U.S. is involved in brokering or negotiating in some way a fuel supply relationship for India with another external source.

In sum, the bottom line for the U.S. is the continuation of IAEA safeguards at Tarapur despite the termination of its fuel supply relationship. It has clearly more than one objection to the independent MOX route (including the "plutonium economy" argument), but the main objection is that this renders IAEA safeguards inapplicable.

Technically reliable

On the other side, the Indian nuclear establishment — in contrast to some temporising voices elsewhere in New Delhi, notably from the External Affairs Ministry — has firmly advocated the MOX route as a technically reliable one (that has reportedly absorbed some Rs. 38 crores of investment over time) that frees India's hands from the prevailing non-performance, the potential legal complications, and the vagaries and uncertainties of an external source of fuel supply as well as of the IAEA under the stewardship of Mr. Hans Blix.

In mid-1981, Dr. Sethna offered the American negotiators the estimate that the fuel supplied to Tarapur by the U.S. was sufficient to keep the station working, on the MOX process, until 1989-90 — not significantly short of the cut-off date for the original fuel supply commitment (1993). Subsequently, he expressed to the U.S. negotiators and also publicly a robust confidence in the process.

At the end of the exercise, Dr. Sethna's delegation is known to have recommended that, in the absence of any perceivable common ground for an "orderly" or mutually agreeable termination of the 1963 agreement and in view of the attempt by the U.S. side to stretch out the negotiations indefinitely, there seemed to be no alternative for India but to act decisively to free itself from the albatross of a non-performing agreement.

The background to this bears reiteration in these columns. Despite a "private" and controversial move by Mr. Gonsalves concerning a PNE (peaceful nuclear explosion) (see THE HINDU of February 22, 1982) that had no demonstrable business with Tarapur, India's basic position in the 1981 Tarapur negotiations was defined by the following guideposts.

The preference was for continuing the 1963 agreement, through the U.S. correcting its performance as a supplier under treaty commitment. If this was not possible, the break should be clean and should free both parties from their rights and obligations — or as Dr. Sethna put it in April 1981 (after Mr. Malone delivered his "bombshell" on termination), "nothing survives."

The United States opened the talks with the unilateral intimation that the exercise must pursue "an agreed termination of the nuclear supply relationship". The basis it proposed was (a) termination of the relationship, and (b) "release of both sides from obligations under the existing agreement while seeing that at the same time the rights and obligations attaching to the application of safeguards on the reactors and materials would continue".

Malone's non-paper

More specifically, the "non-paper" Mr. Malone presented to Dr. Sethna on April 16 stated that a mutually agreed termination "should at a minimum accomplish the following": Terminate the agreement for cooperation, provide for the continued application "at all times" of IAEA safeguards on the items covered by the trilateral safeguards agreement, ensure that a continued commitment that such items would be "only for peaceful purposes and not for any nuclear explosive purposes", and offer a continued commitment that such items shall remain in India.

The non-paper provided some alternative formulae or "sample approaches" on how these objectives could be met. Significantly, Mr. Malone held out the promise of not making "joint determination" of reprocessing an issue, provided agreement could be secured on the other points, and promised "flexibility".

India responded with its own "non-paper" on April 17. It mentioned its preference for a continued (and corrected) implementation of the 1963 agreement, but noted that in view of the decision indicated by the U.S. to terminate the fuel supply relationship, the obligations could not survive one-sidedly on "the party that has fully abided by the agreement."

In brief, the U.S. proposal for terminating the agreement "could not be a suitable formula for agreed termination." Subsequently, Mr. Malone confirmed that "the U.S. has decided not to press approval for reprocessing of the spent fuel" (despite political problems this was said to pose with the Congress), and promised to be responsive to India's "sensitivities" on Tarapur. He was prepared to accept "a low key and unobtrusive arrangement with (the) IAEA, with no U.S. involvement."

A supplement

He presented a supplement to the original non-paper to the effect that the U.S. was proposing that the items covered by the trilateral safeguards agreement of 1971 (between India, the United States and the IAEA) could be placed under an agreement involving a third country, or an agreement regarding a new source of fuel for Tarapur.

By mid-1981, the pressure clearly shifted to making India accept a new external source of fuel, so that the IAEA safeguards could continue and the MOX route could be avoided. In legal terms, Mr. Malone insisted that safeguards under the 1963 and 1971 agreements were tied to certain "vested rights" and "rights in perpetuity" that the United States had over Tarapur.

But "flexibility" would be manifested in the decision to pursue an "agreed termination" on the basis of a "unilateral" or "voluntary" continuation of IAEA safeguards by India. The leader of the U.S. delegation added that the two other areas of interest to his Government were "subsidiary concerns" which could be taken care of through an official statement in Parliament.

In response to all this, Dr. Sethna developed the position expressed in Article VI of the 1963 agreement, that strongly tied India's acceptance of safeguards to the U.S. supply of fuel. Safeguards resulted solely or exclusively from the supplies of U.S. fuel — in the absence of which the entire agreement would be "void."

The head of the Indian delegation announced bluntly in July: "IAEA safeguards will not be acceptable to us. If there is no supply, there can be no safeguards. In our view, no Government can accept such a condition."

The U.S. effort since then has concentrated on deflecting India from a route for Tarapur that would, by obviating the external dependence for enriched uranium fuel, remove IAEA safeguards. Mr. Malone's proposal, made privately to Mr. Gonsalves on the eve of the third round of talks, played upon the possibility of converting a complicated enough trilateral agreement into an affair involving four unequal parties.

To add to the complications, the U.S. has hinted that it might pursue the line that termination of an agreement by one party must, under the international law governing treaties, be preceded by three months' notice; it has also drawn attention to the risks such an action will face from the U.S. Congress.

Ex-Im Bank credit

The current legislation governing the U.S. Export-Import Bank specifies that if a country that has accepted IAEA safeguards "materially violates, abrogates, or terminates....such safeguards" or if it "materially violates, abrogates, or terminates....any guarantees or other undertaking to the United States" (made in an agreement for civilian nuclear cooperation), Ex-im Bank credits to it shall cease. The guillotine can only be got round through a Presidential waiver on grounds of "national interest".

Apart from this, the question arises in official Indian eyes what might happen on the front of economic assistance, or in the multilateral financial institutions, if a determined oppositional stance were adopted.

The United States has also hinted in the course of this exercise that, aside from bilateral modes of making displeasure known, it can take the dispute over the meaning of the 1971 trilateral safeguards agreement to the IAEA.

As 1981's expectations — first of a "clean and orderly" break in the Indo-U.S. nuclear ralationship, then of "unilateral" divorce freeing India's hands from the non-performing relationship — seem to have receded, the uncertainty over, and technical, legal and political questions related to, the future of Tarapur linger.

N. Ram

CSO: 5100/7061

LEAK IN RESEARCH CENTER CYCLOTRON REPAIRED

Calcutta THE STATESMAN in English 13 Mar 81 p 1

[Text]

AS the repair of the leak in the vacuum chamber of the Variable Energy Cyclotron of the Bhabha Atomic Research Centre, Calcutta, has been completed, scientists from national research institutions and universities will resume their scheduled experiments at the Centre next week.

This was stated by Mr A. S. Divatia, Project Director of the Centre, on Friday. He said that an overhaul of the machine was almost due towards the end of last year as it had run for the past seven years. In the meantime, a leak in the vacuum chamber of the cyclotron developed in December. He made it clear that the leak had caused no radiation hazards.

The repairs, he said, had resulted in postponement of the scheduled experiments for about eight weeks; but, a few additional facilities for experiments had been provided in course of the overhauling. The scientists at the Centre he said had worked almost round-the-clock during the past two months to make the repair. They used indigenous components for the new equipment installed during this period. They had to evolve new techniques to manoeuvre a steel structure weighing 20 tons.

Mr Divatia was confident that the cyclotron would be of good use for, at least, another 20 years. About 30 cyclotrons of the same model were giving good performance in laboratories all over the world. This was his comment when his attention was drawn to a report in a section of the Press that the machine had become obsolete. He said that its design was, no doubt a bit old, but new equipment, now available could be used to make up its deficiency.

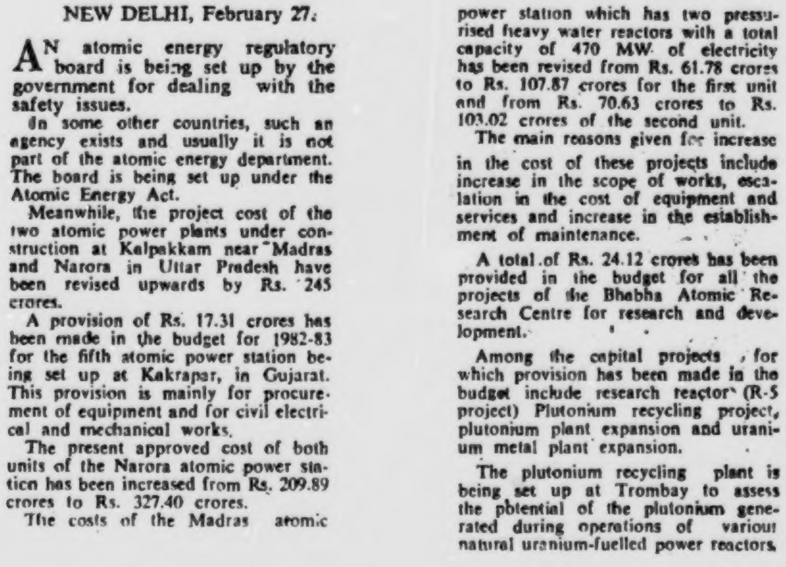
He said that a number of research institutes and universities in the country had been making use of the machine since its commissioning. Its construction started in 1970 and had passed through several phases. The experiments carried on at the Centre mainly related to nuclear physics, radio chemistry and preparation of isotopes for medicinal use. Successful experiments had been made to produce Gallium isotopes for treatment of cancer, he added.

CSO: 5100/7064

ATOMIC ENERGY BOARD, PLANT COSTS REPORTED

Bombay THE TIMES OF INDIA in English 1 Mar 82 p 2

[Text]



NEW DELHI, February 27.

AN atomic energy regulatory board is being set up by the government for dealing with the safety issues.

In some other countries, such an agency exists and usually it is not part of the atomic energy department. The board is being set up under the Atomic Energy Act.

Meanwhile, the project cost of the two atomic power plants under construction at Kalpakkam near Madras and Narora in Uttar Pradesh have been revised upwards by Rs. 245 crores.

A provision of Rs. 17.31 crores has been made in the budget for 1982-83 for the fifth atomic power station being set up at Kakrapar, in Gujarat. This provision is mainly for procurement of equipment and for civil electrical and mechanical works.

The present approved cost of both units of the Narora atomic power station has been increased from Rs. 209.89 crores to Rs. 327.40 crores.

The costs of the Madras atomic power station which has two pressurised heavy water reactors with a total capacity of 470 MW of electricity has been revised from Rs. 61.78 crores to Rs. 107.87 crores for the first unit and from Rs. 70.63 crores to Rs. 103.02 crores of the second unit.

The main reasons given for increase in the cost of these projects include increase in the scope of works, escalation in the cost of equipment and services and increase in the establishment of maintenance.

A total of Rs. 24.12 crores has been provided in the budget for all the projects of the Bhabha Atomic Research Centre for research and development.

Among the capital projects, for which provision has been made in the budget include research reactor (R-5 project) Plutonium recycling project, plutonium plant expansion and uranium metal plant expansion.

The plutonium recycling plant is being set up at Trombay to assess the potential of the plutonium generated during operations of various natural uranium-fuelled power reactors.

CSO: 5100/7059

LONG TERM NUCLEAR ENERGY PLAN

Islamabad THE MUSLIM in English 15 Mar 82 p 5

[Text] NEW DELHI, India has drawn up a long-term plan for stepping up nuclear energy in the country. The Atomic Energy Commission (AEC), the policy-making body of the Government of India for development and utilisation of atomic energy, has planned to increase the nuclear power capacity to 10,000 mw by the end of this century, UNI reports.

At present, the capacity of the nuclear power plants in the country is 640 mw.

The present plan envisages installing of 10 units with the capacity of 235 mw each. A decision has also been taken to go in for four units as against the present system of two. Each power station in the country has two functioning units at present.

This switch-over is mainly to reduce the lead-time required in the opening of new sites. It is also expected that the construction period of the units will be reduced.

Reprocessing plants are also on the anvil. A reprocessing plant to handle irradiated fuel from pressurised heavy reactors is planned at Kalpakkam, near Madras in South India. The plant for reprocessing fuel from the fast breeder test reactor would also be located on the same premises.

Nuclear power generation in India was first initiated in 1960 wtih the commissioning of the Talpur atomic power station, outside Bombay, with an installed capacity of 420 mw.

It was built or a turn-key type contract with a leading U.S. nuclear power plant supplier. The station has been in operation for 12 years, supplying power to Maharashtra and Gujarat States on the western coast. But the capacity of the station has been reduced to 50 per cent because of the uncertainty in the supply of enriched uranium from the United States.

The Rajasthan atomic power station in the State of Rajasthan has two units with 220 mw output. It was a collaborative venture with Canada which provided the design and equipment for heavy water reactor. Unit one of this station came into commercial production in 1973 and the second unit, synchronised to the grid for the first time in November 1980 was in commercial operation from April 1981.

The Narora atomic power station in the Northern State of Uttar Pradesh, consisting of two units with the capacity of 235 mw each of a modified design, is expected to begin commercial operation by the end of 1984.

India is today among the seven countries and the only developing country in the world which has a complete nuclear fuel cycle capability. India has the know-how and, infrastructure to design, construct and operate the facilities right from the initial stages of mining and refining, fuel fabrication, heavy water production and reactor construction to reprocessing and water disposal.

The Indian atomic programme was launched chiefly to supplement the limited conventional energy resources to meet the long-term electricity needs of the country, to produce nuclear power and to utilise techniques in agriculture, industry, medicine and other areas.—PPI Feature

CSO: 5100/5635

BRIEFS

NO REACTOR DECOMMISSIONING--New Delhi, March 11 (PTI)--No nuclear reactor in India is due for decommissioning in this decade, the Prime Minister, Mrs Indira Gandhi, informed the Raiya Sabha today. She told Mr Ramanand Yadav and Mrs Amarjit Kaur in a written reply that all nuclear plants generally were expected to work for about 30 years after which they may have to be considered for decommissioning. The problems associated with decommissioning were well-known and the details would be worked out when required, she added. [Text] [Bombay THE TIMES OF INDIA in English 12 Mar 82 p 9]

FUSION TECHNOLOGY PROGRESS--New Delhi, March 4--India is not lagging behind Pakistan in atomic fusion technology which is in the research stage even in the industrially-advanced countries. The Minister of State for Science and Technology, Mr C.P.N. Singh, told the Rajya Sabha that initial studies had been undertaken at the Bhabha Atomic Research Centre to develop the technology. "There are no bottlenecks," he added. The possibility of Indo-Soviet cooperation in the field of fusion reactors materials was generally considered at the recent meeting of the Indo-Soviet Sub-Commission on Science and Technology. [Excerpt] [Madras THE HINDU in English 5 Mar 82 p 6]

CSO: 5100/7060

SEOUL OPTS FOR FRENCH NUCLEAR TECHNOLOGY

Kuala Lumpur BUSINESS TIMES in English 3 Mar 82 p 2

[Text]

SEOUL, March 2

SOUTH Korea has unequivocally adopted French technology for the next phase of its nuclear development programme.

This became clear following the recent decision to award Alsthom-Atlantique the US$486 million-contracts for turbine generators and auxiliary components to be used in its ninth and tenth nuclear power plants.

Thirteen nuclear power plants are planned in the South Korean programme, and bids may soon be sought for a further two plants.

The Alsthom-Atlantique contract complements the award in November 1980, of a nuclear steam supply system contract for the plants to Framatome, the leading French nuclear plant company and a subsidiary of Creusot-Loire.

Alsthom-Atlantique is the heavy engineering arm of Compagnie Generale d'Electricite, the state-owned group.

But the shift to French technology for these particular plants, following previous and heavy reliance on US technology, has raised questions about the South Korean decision.

When Framatome won its contract, nuclear industry executives thought the contract for the conventional equipment had also gone to France. But Korean Electric Power Corporation (Kepco) evidently changed its mind and sought international bids.

Seven companies from six countries were invited to submit bids for the conventional plant, either as a complete package or in parts. Six responded — Alsthom-Atlantique, Brown Boveri of Switzerland, Mitsubishi of Japan, Westinghouse and General Electric of the United States, and GEC of the UK.

Last November, when the bids were evaluated, Alsthom-Atlantique's initial price was the best, said Mr Choi Chang-Tong, general manager of Kepco's Nuclear Planning Department. But it was clearly now low enough to satisfy Kepco.

"Certainly further deductions were made, particularly in reducing the exchange risk, either as a result of French generosity or Korean negotiating skills," Mr Choi added.

Only a minor portion of the Alsthom-Atlantique contract is subject to price escalation. The price for equipment and materials is quoted in Swiss francs and is not subject to escalation.

Finance for the contract is through a French export credit provided by a consortium led by Societe Generale, Paribas and Banque Francaise du Commerce Exterieur. The interest rate is 7.85 per cent and repayment is over 15 years, starting after seven or eight years depending on the date when the contract is completed. — FT

CSO: 5100/8104

But the most serious accusation made by the WASHINGTON POST is that "rumors have been circulating for some time of complaints raised at the International Atomic Energy Agency about Argentine activities, including an illegal diversion of fuel from its safeguard reactor."

If true, this statement would involve an extremely serious fact which would demand all kind of punishments and preventive measures against Argentina--including embargoes on equipment and the supply of nuclear technology--and, in fact, the paralysis of the works in Embalse, Atucha II, Arroyito and the plant in Cordoba for conversion of uranium dioxide, all of which are being [word indistinct] out with bidding from international suppliers. Furthermore, the nuclear plant not only will be paralyzed, but the credibility acquired by Argentina in the international nuclear forums and the prestige of its peaceful nuclear development program would decisively be shoved aside.

Vice Adm Carlos Castro Madero, who was attending an international nuclear meeting in Tokyo, denied there /the minimum diversion/ of safeguarded material by Argentina, and added that the IAEA reports confirm the fact. He also explained that Argentina /does not have a program for the development of the peaceful use of nuclear explosives/ because it has not proven to be useful so far. He added, however, that the country is not yet in a position to give up in advance the nuclear explosives because eventually they may become necessary for its development.

Argentina respects, in this field, the guidelines established by the Tlatelolco treaty which declares Latin America a "nuclear weapon free zone" and defends the lawfulness of peaceful nuclear explosions and an international procedure to guarantee the peaceful nature of the explosions.

The U.S. State Department spokesman maintains, however, that /"there is no difference between a nuclear bomb for peaceful use and for military use,"/ thus supporting the denunciations made by the WASHINGTON POST.

The difference of opinions between Argentina and the United States is clear, /but it concerns the means and not the ends of proliferation./ The two countries favor the elimination of nuclear weapons and agree on pointing out the risk they represent for mankind. But while the United States and the signatories of the nonproliferation treaty argue that countries that already have nuclear development of the others--including their peaceful efforts--Argentina maintains that the problem of nonproliferation /can only be solved in the political field and that any interference in the free development of the peaceful purposes of atomic energy is an interference in national sovereignty/ and a covert means to maintain a technological and economic /monopoly/.

Both positions seem to be ever more irreconcilable and, in fact, /exchanges and cooperation between the two countries in this field have ceased completely./

The misunderstanding is certainly regrettable because it not only unnecessarily inhibits relations between the two countries which considerably improved in the recent past, but it also /frustrates the specific objectives of both of them./ With a rigid protectionist policy the United States loses the /participation and real possibility of influencing/ countries with plans of independent nuclear development such as Argentina, Brazil and now Mexico. Argentina must also make /extraordinary and superfluous efforts/ to reinvent already existing but embargoed technologies.

The meaning of the /nonrenunciation/ of the right to peaceful explosions by Argentina cannot be interpreted as being synonymous to the desire to build nuclear explosives. This /"nonrenunciation"/ is part of the position of defending the principle of /legal equality/ among states, which is the basis of the international political system and a consequence of the principle of sovereignty.

The nuclear disagreement between Argentina and the United States can only be interpreted as another /deplorable distortion of international relations,/ a fruit of the threat of the atomic war, and must serve as a warning lesson to accelerate the /final disarmament/ of the nuclear arsenals.

CSO: 5100/2125

ARGENTINA

FIRST NUCLEAR FUEL PLANT INAUGURATED

PY050200 Buenos Aires HERALD in English 3 Apr 82 p 9

[Article by George Hatch]

[Text] While Argentina's armed forces stormed the potentially oil-rich Malvinas Islands yesterday, its National Atomic Energy Commission (CNEA) quietly inaugurated the first nuclear fuels factory in Latin America.

CNEA President Carlos Castro Madero, addressing approximately 250 people at the ceremony, called the new plant near Ezeiza a step toward nuclear "self-sufficiency," which would free Argentina from "scientific and technological colonialism."

The factory will supply all the fuel for the Atucha I Centre, now in operation, and the Embalse and Atucha II centres when these come into service during the next 8 years.

In an assembly-line process, the factory compresses uranium dioxide powder into pellets which are fitted into zircaloid tubes. The tubes are then mounted in bundles of 36, each bundle comprising one fuel element (see photo).

The uranium dioxide is derived from mined uranium, a separate procedure which Argentina has recently mastered.

The zircaloid tubes are turned out in a plant adjacent in the fuels facility, with the help of metal rolling machines recently purchased from the Soviet Union.

(Zircaloid's low neutron absorption makes it ideal as a sheathing for uranium dioxide pellets because it does not inhibit the neutron collisions which bring about nuclear fission.)

The fuels plant is one component in the CNEA's plan to master all phases of the nuclear fuel cycle.

The next step, to recover plutonium from the nuclear fuel wastes for use as more fuel (or possibly as fodder for nuclear explosives) is now in progress within a kilometer of the fuels factory.

A pilot reprocessing plant, in the early states of construction, will help the CNEA make its first extractions of the politically [as published] volatile plutonium from spent nuclear fuel rods from its atomic electricity centres.

Speaking with reporters after the inauguration ceremonies yesterday, Vice Admiral Castro Madero explained the CNEA's intention to eventually export its technology to other Latin American countries.

He pointed out the CNEA's supervision of an experimental nuclear reactor in Peru and a bid it has presented to Mexico, offering technical training and technological help for that country's nuclear power program.

Turning to a thornier subject, Castro Madero dismissed a question about whether Argentina would accept nuclear wastes from other countries after it builds its planned atomic waste disposal facility.

"This (issue) is too far in the future," Castro Madero said.

Asked if Argentina's military move into the Malvinas would have any effect on the transfer of politically sensitive nuclear technology to Argentina Castro Madero replied, "I'm tremendously pleased with what happened" in the Malvinas.

CSO: 5100/2127

ESFAHAN NUCLEAR TECHNOLOGY CENTER REACTIVATED

Tehran SOBH-E AZADEGAN in Persian 17 Mar 82 p 11

[Interview with Dr Sa'idi, chief of the Nuclear Technology Center in Esfahan]

[Text] Esfahan. IRNA. Effective measures have been taken in Esfahan to carry out plans to transfer in phases technology for atomic power plants to Iran from abroad.

Dr Sa'idi, chief of the Nuclear Technology Center in Esfahan announced this news in an exclusive interview with IRNA in Esfahan. He said: "In view of the dismissal of a French nuclear company which was in charge of establishing the Nuclear Technology Center in Esfahan by agreement with the past regime at a cost of 3 billion rials, and in view of the discovery of a uranium deposit and the finding of a favorable situation for Iran to have this center, the decision was made that we take action to establish this power plant and build a reactor on a long-term basis with the help of Iranian experts".

He said: "We have set phased, long-term goals on this basis, that is: short-term designing and construction of a critical reactor; medium-term designing and construction of a nuclear research reactor; and long-term designing and construction of a nuclear power plant."

In regard to the three-phase plans in point, the chif of the Nuclear Technology Center in Esfahan said: "In carrying out the first phase, the organizations of the Esfahan center have been changed and, in keeping with that goal, we have organized five groups for the following: nuclear research, thermo-hydraulic materials, electronics and control, uranium, and testing materials. Planning has now been made for each of these groups."

Regarding the funds required to establish this center, he said: "The budget and facilities needed have been approved, and recently our research budget of 220 million rials for short-term research was approved."

Concerning the projects that have started, he said: "Preliminary design for the critical nuclear reactor section have been completed, and its comprehensive design also will be starting the first of next year [21 March 1982], and we hope this project will be completed in the next 6 months. Also, another section of it is to produce fuel and fuel rods--part of which work will be performed in Tehran--and the material obtained will be converted into uranium-oxide powder in Esfahan so it can then be convereted into uranium disks in another unit."

While expressing wishes of success for the Iranian experts, he said: "We completed all assembly work on this unit in a week without any foreign help, and we have also decided to produce the first uranium disk within 6 months."

Regarding the designing and construction of a control system for the critical reactor which is yet another section of the project, Dr Sa'idi, chief of the Nuclear Technology Center in Esfahan, stated: "The designing part of this project, which has a lot of advantages, has been concluded, and construction work on it also has started; and work has begun also on three aspects of the thermohydraulic section."

In conclusion, he pointed out the cooperation of his center with the Industrial College of Esfahan in designing a five-megawatt, fossil-fueled power plant.

CSO: 5100/5301

BRIEFS

NUCLEAR FUSION PROJECT INITIATED--The Energy Ministry has given its approval to a group of private investors from the U.S. who want to set up an experimental nuclear reactor in Israel based on a new type of fusion process. Energy Minister Yitzhak Berman said that no government funds will be spent on the $80 million project, designed to develop a new fusion process and determine if it has a potential for commercial production of electricity. The ministry has recommended to the Israel Lands Administration that it provide a site for the reactor. Berman added that "dozens" of Israeli scientists and technicians will be employed in the project and that this will advance the state of Israel's nuclear technology. Al Schwimmer, former director of Israel Aircraft Industries served as intermediary between the investors and the ministry. Also involved are R.W. Bussard, head of International Energy Systems Company of California and Prof Arye Shani, an Israeli now residing in the U.S. It is understood that the investors are interested in a site along the southern coast near Nahal Sorek. But the head of the ministry's nuclear energy division said that the small-scale experimental reactor does not have to be near a source of large quantities of water, a standard requirement for larger, operational power plants. The process of nuclear fusion which releases energy as nuclei of hydrogen atoms are fused, has never been successfully harnessed to produce electricity. All existing nuclear power plants, including those Israel seeks to build during this decade, are based on fission processes which split the nuclei of uranium atoms. Experiments to develop a suitable fusion process have been conducted for several decades in the U.S. and the Soviet Union. [Text] [Jerusalem THE JERUSALEM POST in English 21 Mar 82 p 1]

YELLOWCAKE FROM PHOSPHATES--Uranium 'yellowcake' production will commence in the near future in a plant being established by Negev Phosphates in the Rotem plain, southeast of Beersheba. The uranium, to be produced from phosphorous acid, a product of phosphate ore, will provide half of the fuel requirements for the nuclear power stations of the type Israel plans to build. The process by which the uranium will be produced is well-known and is used in a number of countries, including the U.S.A. It yields half a kilogram of uranium for every 1,000 kilograms of raw material. An international committee, including representatives of the Atomic Energy Commission, the Ministry of Energy, the Dimona Nuclear Research Facility and Negev Phosphates, is presently discussing the problems, opportunities and political and economic implications of the planned venture. [Text] [Tel Aviv BUSINESS REVIEW & ECONOMIC NEWS FROM ISRAEL in English No 82, 1981/IV p 5]

CSO: 5100/4710

BRIEFS

UNIVERSITY NUCLEAR PROGRAM ESTABLISHED--A graduate studies program at the nuclear engineering department at King 'Abd-al-'Aziz University in Jiddah will start beginning next year. The head of the department, Dr Sami 'Abd-al-Majid, said that the graduate program will have two specialities. The first will be radiation safety engineering and the application of theories of radioactivity. The second speciality will be nuclear reactor and nuclear energy engineering. Dr Samir 'Abd-al-Majid added that the program will accept those with degrees in nuclear engineering as well as those holding B.S. degrees who would have to take other courses which will compensate for whatever they lack in the theoretical areas of engineering. Such courses would be offered at the department. [Jiddah AL-MADINAH in Arabic 13 Feb 82 p 3]

CSO:5100/4712

RESEARCHERS STUDY URANIUM AMOUNT IN LAMINATED PLATES

Paris REVUE GENERALE NUCLEAIRE in French No 6,Nov-Dec 81 pp 577-579

[Article by Y. Fanjas: "The Recent Developments in Laminated Fuels for Research Reactors"]

> [Text] The author describes the characteristics of laminated fuels and the achievements in this area by the Societe CERCA [Company for the Study and Manufacture of Atomic Fuel], showing that the technology developed satisfies the requirements of low enrichment while maintaining satisfactory performances for the reactors.

Uranium enriched to 93 percent was up to now the selected fuel for research reactors. Now in the last few years (starting from 1978), the policy of nonproliferation of nuclear arms has been manifested by the establishment, under the sponsorship of the IAEA, of an international program strongly supported by a program of the American Department of Energy, the so-called "RERTR Program" (Reduced Enrichment for Research and Test Reactors). The purpose of this program is to permit these reactors to use uranium of reduced enrichment while minimizing losses in performance.

Thus the fuel manufacturers were led to adapting and developing their technologies to maintain in the elements a mass of U235 sufficient to assure the satisfactory operation of the reactors.

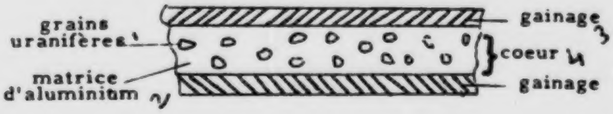
The various international meetings (on this topic) revealed the desire of reactor operators to keep a fuel as similar as possible to the one they now have to limit to the maximum reactor modifications and thus simplify safety problems. Thus the laminated fuel plates now used for most research reactors continue to be of interest and are being developed by the manufacturers concerned, especially CERCA, which has become internationally famous in this area.

Indeed, over more than 20 years, approximately 180,000 plates have left the workshops of the Romans works (in the Drome) headed for French (SILOE, OSIRIS, ORPHEE, RHF,...) and foreign reactors (Belgium, Holland, Sweden, United States, Canada and now Japan, not to mention others). The developments conducted by CERCA since 1978 were based naturally on this vast experience of theirs.

[Let us recall briefly of what a laminated fuel plate consists] /in boldface/: a fissile core, consisting of a uraniferous material scattered in the form of grains in an aluminum matrix, is enclosed tightly in an aluminum alloy can. Fig 1 shows the stages of the manufacturing process. The main phases include the production of the core (or nucleus) by the so-called powder technology (compacting of the mixture of uraniferous and aluminum grains) and co-lamination of this core placed in a frame between two aluminum alloy lids.

Although they may vary considerably from one reactor to the other, the typical dimensions of a plate after lamination are from 600 to 800 mm long, 60 to 80 mm wide and 1.27 to 1.50 mm thick; the core being 0.5 mm thick.

A cross-section perpendicular to the flat surface allows it to be represented as follows:



1. uraniferous grains 2. aluminum matrix 3. casing 4. core

The need for maintaining, and even increasing if possible within an unchanged volume the weight of uranium 235 results in the increase of the total weight of uranium to be introduced by a ratio equal to or higher than that of the enrichments. Thus to reduce the enrichment from 93 to 20 percent, the total amount of U is to be multiplied by 5 in the first approximation.

The above plan shows the two means the manufacturer has to achieve this objective:

--increase the volume of the dispersed material at the cost of the matrix, that is, increase the number of uraniferous grains, therefore the total percentage of aluminum (or titer);

--replace the present uraniferous material (mixed compound of UAl_3-UAl_4, called UAl_x) by materials of higher density, with greater uranium content and inert with respect to the matrix, such as U_3O_8 and U_3Si; Table 1 indicates the densities and the uranium contents of these different materials.

The combination of these two methods allowed the CERCA to achieve, on full size plates and under industrial conditions, the results indicated in Table II.

Although the use of UAlx does not permit a total uranium density in the plate higher than 2.2 g/cm^3, which is very inadequate for convering most elements to a 20 percent enrichment, it is nevertheless interesting in two cases:

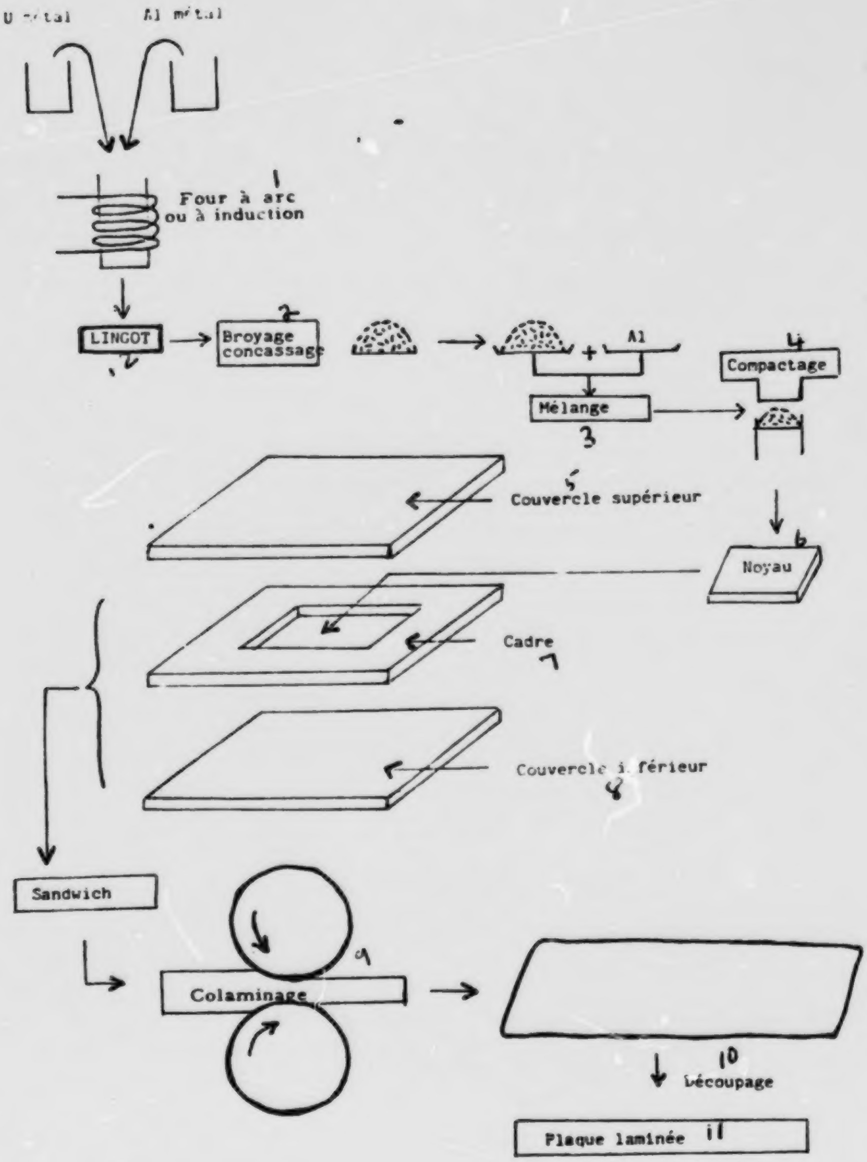

U métal
Al métal
1
Four à arc
ou à induction
LINGOT
12
2
Broyage
concassage
Al
4
Compactage
Mélange
3
5
Couvercle supérieur
6
Noyau
Cadre
7
Couvercle inférieur
8
Sandwich
9
Colaminage
10
Découpage
Plaque laminée
11

Fig 1. The different operations in the manufacture of a laminated fuel plate 1. arc or induction furnace 2. breaking, crushing 3. mixing 4. compacting 5. upper cover 6. core 7. frame 8. lower cover 9. co-lamination 10. cutting 11. laminated plate 12. bar

--the case where a thickening of the plate core is possible (either at the cost of the casing thickness, or of plate thickness);

--the case where reducing the enrichment to 45 percent seems sufficient.

That is why the CERCA made a considerable effort resulting in eight prototype elements with different charges, geometries and enrichments meant for irradiation in the reactors SILOE in Grenoble, HFR in Petten (Holland) and ORR in Oak Ridge (in Tennessee).

The first of these elements, charged with 2.2 g/cm^3 45 percent enriched uranium, was placed in the SILOE reactor in February 1981 and could be irradiated up to an average 50 percent burn-up without damage; such a result had never been achieved before in the whole world with this type of fuel.

U_3O_8, because of the total uranium density of 3.2 g/cm^3 which it allows, increases greatly the possibilities of conversion to 20 percent and many potential users have shown interest in it. Three irradiation prototype elements, with a charge of 3.2 g/cm^3 20 percent enriched uranium are planned by CERCA by the end of the year (one for SILOE and two for ORR). Other prototypes are planned for other reactors.

Table I: Density and total charge of uranium in different fuel materials

Material	Density (g/cm^3)	Total U densities (g/cm^3)
UAlx ($UAl_3 + UAl_4$)	6.3	4.5
U_3O_8	8.3	7
U_3Si	15.2	14.6

Table II Total uranium densities achieved in the plates laminated by CERCA

Material	Total U densities (g/cm^3)
UAl or UAlx$^{(1)}$	0.6 to 1.35
UAlx$^{(2)}$	2.2
U_3O_8	3.2
U_3Si	6.5 (sought: 7 to 8)

1. Before development

2. After development

Although the UAlx and U_3O_8 developments have now been perfected and are operational industrially, the latest technological developments concern U_3Si, which has already permitted CERCA to achieve 6.5 g/cm^3 and should finally enable them to achieve 7 to 8 g/cm^3, that satisfies the need for conversion of almost all the reactors. The U_3Si-Al plates with 6.5 g/cm^3 obtained in the industrial workshop in CERCA already fulfill the strictest specifications.

The development studies carried out have already materialized in the form of two large orders: the first concerns the University of Kyoto in Japan to which CERCA delivered a core of 18 elements in March 1981. The divergence took place on 15 May 1981.

This delivery represents a world first (in two respects) since it was the first manufacture at reduced enrichment since the launch of the RERTR program and the first Japnaese order abroad for research reactor fuel.

The second order concerned 20 elements with 20 percent enrichment for the Ford reactor in the United States, which should be delivered in Spetember 1981.

The above statements show that the technology of laminated plates remains perfectly suitable for satisfying the requirements of low enrichments while maintaining performances satisfactory for the reactors. The high charges attainable because of U_3Si will even make it possible to avoid geometrical modifications of the elements, which is very advantageous since the thermo-hydraulic conditions of the reactor will thus remain unchanged.

In conclusion one should remember that if the irradiation programs in progress or those remaining to be implemented for the final qualification of the fuels are completed, the technological solutions and the production processes are ready for satisfying the needs of reducing the enrichment of research reactors using laminated fuel plates.

9018
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27 April 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 140

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27 April 1982

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 140

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DOCTORS URGE MORE ACTIVE GOVERNMENT ROLE IN NUCLEAR WAR ISSUE

Perth THE WEST AUSTRALIAN in English 1 Mar 82 p 28

[Text] **SYDNEY: Seventy Australian doctors have written to the Prime Minister, Mr Fraser, asking that Australia play a more active role in world disarmament.**

The doctors, members of the Australian branch of the Medical Association for the Prevention of War, which was formed six months ago, said that their concern arose from the great risk posed to public health by the threat of nuclear war.

The letter urged Mr Fraser to instruct the Australian delegation to the United Nations General Assembly to call for immediate implementation of a comprehensive programme of international disarmament.

The doctors also said that the Australian Government should exert immediate pressure on the American and Russian governments to suspend further growth of military programmes and stop arms sales to Third World countries.

They called on the Government to establish a fund for peace studies and educational programmes on disarmament.

The association's Australian branch chairman, Dr Richard Kefford, said yesterday that nuclear war was the ultimate public-health issue of our time.

"Public opinion is the only way the imminent health risk of nuclear war can be prevented," he said.

A Third World war was already raging between public opinion and the arms race, he said, and he hoped that public opinion would be victorious as it was in "abolishing the slave trade and bringing a quick end to the Vietnam war."

At the same time, millions of dollars were being diverted from health care to the buying of military equipment.

"On a worldwide basis, 20 times more money was spent on arms than on health," he said.

"In Australia, for a sixtieth of the $300 million paid for HMS Invincible, trachoma could have been eradicated permantly among Aborigines."

At least 40 per cent of the world's people were ignorant of the effects of a nuclear war, he said.

Blast thermal effects and the initial ionising radiation from a one-megaton thermonuclear explosion over a city the size of Sydney or Melbourne would result in the immediate deaths of about 500,000 people.

Australia did not have the medical resources to cope with such a calamity and would be a prime target if war did erupt because of the U.S. military bases, Dr Kefford said.

CSO: 5100/7520

ABORIGINAL OWNERS GIVE GO-AHEAD FOR URANIUM MINING

Agreement Signed

Perth THE WEST AUSTRALIAN in English 2 Mar 82 p 3

[Text] **DARWIN: Traditional Aboriginal owners have given the go-ahead for Australia's biggest uranium development.**

It is Pancontinental's Jabiluka mine in the Northern Territory's Kakadu national park.

The mine will cost an estimated $600 million to construct and uranium and gold production could be worth more than $18,000 million at today's prices.

Negotiating teams from Pancontinental and the Northern Land Council, which represents the traditional owners, initialled terms of agreement in Darwin in the weekend.

The move was announced in Darwin yesterday by the head of the NLC negotiation team, Mr Eric Pratt, QC, of Brisbane.

He said in a statement that the traditional owners at Jabiluka had instructed the negotiating team to initial terms on agreement with Pancontinental last Friday.

The three-man Pancontinental team, led by Mr Terry Cole, QC, of Sydney, travelled to Darwin on Saturday.

Mr Pratt said that comment would now be sought from about 1000 Aborigines who would be affected by the development.

This was required by law.

Mr Pratt said: "It is expected that, with the careful attention paid to the negotiations by the traditional owners and Pancontinental Mining Ltd since the negotiations began a year ago, the terms now agreed will meet early official approval and the way will be open to start construction by the end of the wet season."

In **SYDNEY**, the chairman of Pancontinental, Mr Tony Grey, said he considered the suggestion on the possible start of construction to be "a bit premature."

But he was pleased that the agreement had been initialled.

"It is a major step towards bringing Jabiluka into production," he said.

Mr Grey said that the Federal Government had not allowed Pancontinental to sign sales contracts for uranium before official approval had been given for the mine.

The company would have to sell enough uranium before it could make a start on the mine.

The company was looking at Japan, Europe, the United States and Korea as potential markets, but it was too early to say when enough sales would be made for construction to begin.

Recoverable ore reserves in the Jabiluka 1 and Jabiluka 2 deposits were estimated at 53.3 million tonnes.

However, the company would mine only the Jabiluka 2 deposits.

Tests on the ore indicated that mining would yield 200,000 tonnes of yellowcake and about 12,000kg of gold.

About 1600 people would be employed during the three-year construction phase and about 900 during its projected 25-year operational phase.

Jabiluka Plans

Canberra THE AUSTRALIAN in English 3 Mar 82 p 21

[Text] FULL development go-ahead for the Jabiluka uranium mine in the Northern Territory could still be some time away, a spokesman for the Northern Land Council warned yesterday.

Mr Wesley Lanhupuy, director of the council's bureau, was commenting on Monday's announcement that an agreement which would ultimately allow development of Jabiluka had been initialied.

The agreement was between a professional negotiating team retained by the council and Jabiluka's operator, Pancontinental Mining.

It was hailed as an important step in moving toward development of Jabiluka, and some sources said construction could start as early as this year.

Mr Lanhupuy said that, although he welcomed progress toward completion of the negotiations with Pancontinental, he felt caution should be exercised concerning the time required to finalise these negotiations.

He would not comment on the time required to take the legal steps necessary to get the project under way.

"As stated in the press release from the Northern Land Council negotiating team, the initialled terms of agreement must now go to the Aboriginal people affected by the project for their comment," he said.

"This must occur before a full meeting of the Northern Land Council considers the matter and either consents to the agreement or withholds its consent.

"The Federal Minister for Aboriginal Affairs, Senator Baume, must then give his consent to the agreement before it can be effected."

CSO: 5100/7520

ATOMIC ENERGY COMMISSION WORKS ON SILICON FOR MICROCHIPS

Canberra THE AUSTRALIAN in English 2 Mar 82 p 25

[Text] A NEW technique for preparing silicon for use in advanced microchips is under consideration at the Australian Atomic Energy Commission at Lucas Heights.

The technique has already been assessed as a highly attractive commercial step in microchip fabrication.

A senior official of the commission, which performs extensive research in computing, gave details of the new project recently at a special Australia-New Zealand Association for the Advancement of Science (ANZAAS) conference on venture capital and innovation.

The AAEC's commercial applications manager, Mr A. Walker, told the meeting, which presented an almost uniformly bleak picture of the prospects for entrepreneurial high-technology companies in Australia, that researchers at the Lucas Heights Centre had developed several commercial innovations in computing.

"The commission has long been involved in computer usage, and the complex calculations required for nuclear reactors could never be completed within acceptable time limits without sophisticated computer hardware and software," he said.

But the new technique the commission hopes to develop commercially is not an application of computers, but rather a materials science process to provide microchip manufacturers with silicon carefully tailored to specific needs.

Mr Walker told the meeting internal AAEC work in hardware and software had often had direct commercial applications and demonstrated the value of research in high technology.

The best-known innovation in computing developed at Lucas Heights, the AAEC's Pascal compiler, results from nuclear researchers' needs for a versatile programming language.

A project mounted in cooperation with Japanese and American experts had produced the compiler, and subsequent refinements had resulted in "vast improvements".

"The AAEC undertook a market survey and established that ready markets existed for the compiler in Europe and North America," he said.

LICENSED

Agents have been licensed to sell the compiler in both areas, while examination of the Japanese market is under way and a representative is to be appointed in Tokyo this year.

The AAEC has also approved agreements with computer-makers other than IBM — some IBM systems are already compatible with the device — for modification of the compiler to achieve compatbility with their own equipment.

This is expected to increase the market for the compiler and the commission's gain from the project, as the AAEC has reserved the exclusive marketing rights for the modified device.

The marketing of the compiler illustrates the AAEC's pursuit of a Government policy to "maximise the revenue-earning potential of instrumentalities".

The commission is encouraged to develop commercially any processes or techniques perfected in its research which cannot be supplied by the private sector.

One of the most spectacular examples of this category is the new project discussed by Mr Walker at the ANZAAS conference.

"The AAEC is currently investigating the provision of a service which will require considerable innovation and funding," he told the meeting.

The commission planned to use its HIFAR research reactor for treating silicon ingots, as used in the manufacturing of semiconductors.

"To obtain various electrical characteristics of silicon semiconductor material, it is necessary to produce pure silicon crystals and then add — or 'dope' — those crystals "with a particular impurity," he explained.

During the early stages of semiconductor development, such impurities had been added to the crystals during the "melt" stage of production.

"Over the past decade the development of high-voltage silicon devices has increased the need for high-resistivity crystals with a dopant uniformity which exceeds the capabilities of conventional production techniques.".

For a particular category of silicon crystals (N-type), the technique of thermal neutron irradiation could be used to achieve a high degree of uniformity in doping the silicon with phosphorus.

PROBLEMS

"This technique — termed neutron transmutation doping (NTD) — is the nuclear conversion of silicon atoms into phosphorus dopant atoms by exposing undoped silicon crystals to a suitable flux of thermal neutrons in a nuclear reactor," Mr Walker said.

The technique is highly attractive because it makes possible the production of silicon crystals with extreme homgeneity and resistivity values, for commercial applications.

No problems with radiation are caused by the method under consideration by the AAEC, provided pure silicon is used and is cleaned properly before being placed in the reactor.

"Because of the revenue-earning potential of the process, its knowhow is a carefully guarded commercial secret and very little information is available on the practical means of accomplishing the process," Mr Walker told the meeting.

But he did disclose that AAEC studies had been carried out on the prospects of introducing NTD at Lucas Heights.

The studies have confirmed that the Lucas Heights HIFAR reactor can be used in the commercial process.

The commission plans to carry out trial irradiations of silicon to demonstrate to a potential customer that the method is viable.

But Mr Walker warned that the purchase of the equipment needed to perform the process on a commercial basis would be a "major financial problem" for the AAEC.

CSO: 5100/7520

BRIEFS

URANIUM SITE BAN--Some senior WA unionists hope to ban construction work on the $320 million Yeelirrie uranium project, the developers of which are expected to make the final go-ahead decision by the end of the year. A meeting of union officials in Perth yesterday called for a meeting of construction unions to consider the implementation of the ACTU's policy against the mining, milling and export of uranium. After the meeting the TLC secretary, Mr Peter Cook, said that the meeting was aware of the pressure from governments, the courts and employers on the unions which had attempted to uphold the policy in the Northern Territory and Queensland. There had been physical difficulties in maintaining the bans in the NT and Queensland but there was some hope of more success if the bans were applied before Yeelirrie got off the ground. Much of the meeting was taken up with discussion on the controversial decision of the ACTU executive in December to lift bans on the uranium projects in other States, a move widely interpreted as an end to the policy of opposition to the uranium industry. Despite the ACTU policy there is already a 10-tonne stockpile of yellow cake at Kalgoorlie, the product of testing the Yeelirrie ore at a $20 million treatment plant built on the outskirts of Kalgoorlie. [Text] [Perth THE WEST AUSTRALIAN in English 20 Feb 82 p 7]

NUCLEAR REFERENDUM BAN--The Stirling City Council has been refused permission to spend ratepayers' funds on a referendum on the issue of a nuclear power station in WA. The Cabinet decided yesterday that such a referendum would be improper use of ratepayers' funds. The Deputy Premier, Mr Rushton, said afterwards that under the Local Government Act councils could conduct referendums on matters that came within their jurisdiction. But they must seek the Minister's approval before having a referendum on matters that did not relate to their responsibilities. The council had estimated that the cost of the proposed referendum would be no more than $5000. But the Cabinet had decided to refuse permission for the spending. The Premier, Mr O'Connor, had already made it clear that there was no need for the Government to consider a nuclear power station before the year 2000. On that basis alone, there was no justification for spending ratepayers' funds to arrive at a conclusion that could not influence anything. [Text] [Perth THE WEST AUSTRALIAN in English 23 Feb 82 p 4]

STREET TO ADDRESS UN--The minister for foreign affairs, Mr Street, is to address a major United Nations conference to argue Australia's case for a treaty against the testing of nuclear weapons. Radio Australia's Canberra office says Mr Street will address the United Nations Special Session on Disarmament in June against the background of rising concern in Australia over nuclear weapons. Our office says world leaders scheduled to address the session include President Reagan, the British prime minister, Mrs Thatcher, and Japan's leader, Mr Suzuki. It's also reported that President Brezhnev might attend. The prime minister, Mr Fraser, delivered a major speech at the special session on disarmament 4 years ago. Before and after Mr Fraser's address, Australia has consistently argued at world forums for a treaty against nuclear tests. [Text] [BK120912 Melbourne Overseas Service in English 0830 GMT 12 Apr 82]

CSO: 5100/5645

'HINDU' NOTES KARACHI NUCLEAR EXPERT IN U.S.

Madras THE HINDU in English 22 Mar 82 p 6

[Article by N. Ram]

[Text] WASHINGTON, March 21.

That Mr. Tariq Mustafa, an engineer and experienced official from Pakistan's Atomic Energy Establishment — who had also served with the IAEA — has quietly taken over as the ranking diplomat in charge of technical affairs at the Pakistani Embassy in Washington is a detail that will be of political as well as specialist interest in India.

The U.S. does not have a current nuclear cooperation or supply relationship with Pakistan. Nor for that matter does it have a significant relationship in the science and technology field. The only direct or official U.S. export of sensitive nuclear material to Pakistan during the last four years reportedly involved less than one gramme of plutonium in 1978. However, the procurement of sensitive U.S.-supplied items for Islamabad's clandestine nuclear project via Canada and Europe has been reported and has, in fact, become a minor political scandal in the countries involved.

The connection, if any, of the new Minister (technically in the Pakistani Embassy) with the reprocessing and enrichment projects is not known at this point, and no one has suggested any involvement in the procurement effort. Nevertheless, the decision of the Zia regime to send this nuclear engineer and official connected with the Atomic Energy Commission (PAEC) to Washington, and the U.S. decision to accept a diplomat with this background, might be a sign of the times in the bilateral relationship that seems to have political implications for India.

CSO: 5100/7071

INDIA

EXPERT CALLS FOR EXPANSION OF NUCLEAR POWER PROGRAM

Bombay THE TIMES OF INDIA in English 23 Mar 82 p 4

[Text] March 22.

The Tarapur Atomic Power Station (TAPS) gives the cheapest nonhydel power in the country, according to Dr. M. R. Srinivasan, director of the power project engineering division of the atomic energy department. The energy cost of the Tarapur power was 18 or 19 paise per kilo watt hour.

In his key-note address on the second national symposium on operating experience of nuclear reactors and power plants at the BARC today, Dr. Srinivasan said the TAPS belied the dismal prophesies made by the cynics when the decision was taken to set up the first nuclear power station. The decision was compared by some critics to a hungry man going to set up a bakery instead of buying a loaf of bread. The record of Tarapur had frustrated the critics, he said.

Despite the political arm twisting with regard to certain essential supplies and the delays, cost escalation and operational problems notwithstanding, time was now ripe for boldly expanding our nuclear power programme, Dr. Srinivasan opined.

The target of 10,000 MW of nuclear power by the turn of the century appeared feasible with our achievements in the engineering and fabrication of critical components, supported by impressive research and industrial infrastructure, he said. However, there should be matching investments in production of heavy water, new uranium mines and other industrial inputs.

Over 530 nuclear units with an aggregate capacity of 400,000 MW were either in operation or under construction all over the world and viewed in proper perspective, their overall benefits to society would far outweigh any possible risks, it was stated.

Analysing the achievements and failures of the power plants, Dr. Srinivasan remarked that our performance standards had to be substantially improved to restore the nation's confidence in our ability to meet the energy needs.

Earlier, Dr. H. N. Sethna, chairman of the Atomic Energy Commission, in his inaugural address, said the adverse effect of voltage and frequency swings was causing serious concern, especially in the case of nuclear power plants and other large thermal units. The concerned authorities should review the present policies and practices to improve the situation, he added.

Though adherence to rigid quality control had delayed the projects, manufacturers should pay greater attention to achieving quality without delays. The service conditions of power generation personnel should be improved adequately, considering their responsibilities and the employment scenario, Dr. Sethna felt.

The three-day symposium is being held under the auspices of the board of research in nuclear sciences of the DAE.

CSO: 5100/7072

AIR INDIA NEGLIGENT IN SELLING RADIOACTIVE PARTS

Bombay THE TIMES OF INDIA in English 21 Mar 82 p 1

[Article by S. Balakrishnan]

[Text] AIR-INDIA officials were negligent in the auction of uranium-containing parts of its Boeing 747, "Emperor Ashoka," which had crashed into the sea soon after take-off from Santa Cruz airport on January 1, 1978, preliminary inquiries by the Central Bureau of Investigation (CBI) reveal.

The salvaged wreckage of the ill-fated Jumbo aircraft was handed over to Air-India following the court of inquiry. The airlines had made its claims to the General Insurance Corporation (GIC). The auction was conducted by Air-India on behalf of the GIC.

Among the parts auctioned were two uranium-bearing balance weights used in the aircraft's rudder and outboard elevator. The parts contained more than the quantum of radioactive substance prescribed in the Atomic Energy Act and hence their disposal was in violation of the law, CBI officials contend.

BOEING MANUAL

In any case, the Boeing Structural Repairs manual requires that damaged weights be returned to the National Lead Co., Albany, New York.

The manual states "some balance weights on upper rudder and outboard elevators are made from depleted uranium, which is naturally occurring uranium that has been 'depleted' of most of the isotope U235. This remaining low-level radioactive uranium, similar to heavy metals, is toxic if ingested, absorbed, or inhaled into the body. These weights are identified with legends permanently stamped into the surface of each weight to assure special handling during maintenance."

The return of the damaged weights to the firm is also clearly advised. It was not clear, if the material had any strategic value. But, the possibility of a conspiracy in their disposal has been ruled out by the bureau.

The result of Air-India's negligence was that the sensitive parts landed in the hands of scrap-dealers. Three of them along with another person working for a shipping firm were arrested in connection with the incident.

The investigation by the bureau was delayed since certain documents were not promptly available. A number of airline officials have been interrogated and the possibility of arrest for criminal negligence cannot be ruled out, CBI officials say.

Incidentally, the uncovering of the scandal followed the casual visit of a CBI officer to one of the south Bombay restaurants. The officer happened to overhear some conversatoin about the sale of the parts. He immediately arranged for a decoy who managed to win the confidence of the persons concerned. Later, a senior official posing himself as an industrialist tried to "negotiate" a deal with these persons and before anybody could "smell a rat" the foursome were in the CBI net.

CSO: 5100/7070

FUEL ECONOMY PLAN FOR TARAPUR DESCRIBED

Bombay THE TIMES OF INDIA in English 25 Mar 82 p 1

[Article by S. Kumar]

[Text] WHETHER the U.S. supplies fuel for Tarapur or not, whether the indigenously made substitute, mixed oxide fuel, is ready or not, the Tarapur plant will run, at least for two years more at its present capacity.

The reactor physicists have evolved a new pattern of "fuel economy" which enables the existing fuel to be used again, thus extending the period of operation of the plant. The fuel economy effected at Tarapur is considered to be a technological feat because fuel management in a nuclear power plant is far more complicated and hazardous than it is understood in the conventional sense.

The fuel pool in Tarapur contains 911 irradiated fuel bundles and 314 of them have been prematurely removed from the core of the reactor as some of the rods in these bundles were found defective.

The prematurely discharged bundles can be reused in the reactor after replacing the defective rods with good ones from similar bundles. Such an experiment was carried out in 1974 at the Tarapur plant. A programme for the reconstitution of the fuel bundles is being initiated by the authorities.

The prematurely discharged bundles, also known as "failed bundles," contain about 2 per cent of enriched uranium, which can be reused. The fuel bundles also contain some high quality plutonium.

A fairly accurate theoretical estimate of the various fissile and fertile contents of each of the bundles has been made by the scientists.

A group of physicists at the theoretical reactor physics section of the BARC told the current second national symposium on nuclear reactors and power plants that "these materials, if judiciously recovered and recycled, can prolong the operating life time of Tarapur reactors with no fuel supply from other sources."

For the first time, the scientists have developed a computer programme, which simulate the core of the boiling water reactor at Tarapur. The programme helps decide the reloading pattern of the fuel bundles in less than 15 seconds. The theoretical reactor physics division took over the fuel management of Tarapur reactors from the General Electric Company in 1976.

NO VIOLATION OF PACT

All the irradiated bundles, including the defective ones, are kept in spent fuel pool under 60 or 70 feet of water. From the Indian point of view, using the underutilised bundles again in the reactor does not constitute any violation of the Indo-U.S. agreement on fuel supply.

The agreement only prohibits unilateral reprocessing of the spent fuel. In the method now proposed, no reprocessing is involved and the fuel is used for the purpose it was given—to produce power.

Though the theoretical possibility for reusing the bundles has been well established, to get them ready will be a tough task. However, some of the bundles can be rightway used in the reactor as the strength of these bundles would be sufficient to produce power at 50 per cent of the installed capacity.

It is believed that the existing fresh fuel itself would help the plant run for two more years because the plant is running at half its capacity.

According to the calculations made, the 911 discharged bundles contain 1,364 kg. of uranium-235 and 491 kg. of plutonium, which can be used for making weapons. However, the fate of the sepnt fuel hangs in balance just as the stalemate continues in the Indo-U.S. talks on the fuel supply.

CSO: 5100/7073

PLANS FOR CHASHMA NUCLEAR COMPLEX REVIVED

BK140646 Hong Kong AFP in English 0631 GMT 14 Apr 82

[Text] Islamabad, 14 Apr (AFP) -- Pakistan is to go ahead with a nuclear power project at Chashma, with a generating capacity of 937 megawatts, almost 50 percent more than plannned in an earlier project, official sources said today.

The project, costing over 1,600 million dollars, will be completed by mid 1988, they said. Chashma is some 250 kms (160 miles) south of here.

An original project, planned under executed former Premier Zulfiqar Ali Bhutto in 1976, called for a 600-megawatt nuclear complex including a fuel reprocessing plant from France.

The plan was abandoned owing to stiff opposition from the United States, which feared Pakistan might acquire the ability to detonate an atomic bomb. Former French President Valery Giscard d'Estaing suspended the deal despite Pakistan's assurances that its nuclear program was geared at peaceful purposes.

No details were given about the new set up, but official sources stressed that nuclear generation was vital owing to an acute shortage of power. With the high cost of oil, nuclear power was the only economical alternative for Pakistan, the sources said.

Pakistan has a first nuclear power plant in Karachi, the country's largest city.

CSO: 5100/2144

'WEN WEI PO' ON PRC NUCLEAR, SPACE TECHNOLOGY

HK090548 Hong Kong WEN WEI PO in Chinese 9 Apr 82 p 1

[Dispatch from correspondent Cheng Hsiang [4453 5046]: "China's First Nuclear Powerplant To Be Built in Shanghai in 2 Years"]

[Text] According to an authoritative person in Beijing's science circles, China will score successes of great significance in advanced branches of science in the next 1 or 2 years.

China is going to apply nuclear technology to the civil industries in the next 1 or 2 years, said this authoritative person at a news conference held here today. The first nuclear powerplant in the country will be built in Shanghai. This nuclear powerplant, to have a capacity of generating 300 billion watts, will be a pressurized water-type reactor. At present, all the design work has been completed.

This authoritative person said that in view of the technological level in the world today, only a nuclear powerplant with a designed generating capacity of 900 billion watts is commercially feasible. Even so, it must be recognized that this project will mark tremendous progress for China. China has decided to first build a small experimental nuclear powerplant. Then, from the experience gained, it can improve on design work, and thus speed up the application of nuclear technology to civil industries.

As reported, this nuclear powerplant project has been designed and most of the equipment and accessories required, except two essential component parts, will be made by China itself. The production of these two component parts, namely, the steam generator and the major pump, is still beyond China's capability. Therefore, it is believed that China will have to import them from foreign countries.

This authoritative person also disclosed that China would launched a synchronous satellite in 1983 or 1984. This project, if successful, will push China's space technology a great step forward.

As he explained, in order to launch a satellite which moves at the same speed as that of the earth's rotation so that it can permanently stay at a relatively fixed point above the earth, two technical problems have to be overcome. First, the satellite must be kept under control at all times, and second, rocket thrust must be powerful enough to inject the satellite into orbit. China's performance in solving the first problem has already been outstanding. After the United States and the Soviet Union, China is the third country in the world to have successfully retrieved a satellite. This shows that China has reached a certain level in satellite control techniques. In the future, China will improve its techniques by launching a synchronous satellite. The second problem will be a test for China's ability or rocket propulsion as a synchronous satellite needs to be injected into a higher orbit. At present, China possesses two-stage rockets. To inject a satellite into a higher orbit requires a three-stage rocket and, moreover, the use of liquid propellent. This is really a severe test. Now, China is conducting research in this field. If this research is successful, China's space technology will be pushed up to a higher level.

This authoritative person said that the transition from theory to practice marks a leap, and the course from experiment to commercial product marks another leap. Actually China is not weak in terms of basic theory, but relatively weak in the fields of experimentation and application. Therefore, based on the outcome of the above two projects, we will be able to estimate in general the level of science and technology of China in the 1980's.

CSO: 5100/2144

'KYODO' CITES FANG YI ON PRC NUCLEAR RESEARCH

OW070043 Tokyo KYODO in English 0008 GMT 7 Apr 82

[Text] Beijing, April 7, (KYODO) -- Chinese Vice Premier Fang Yi said Tuesday that China is trying to make a small particle accelerator on its own. He thus indicated that China was engaged in the development of such an accelerator for use in nuclear tests and other purposes.

Fang revealed this in a meeting with Tetsuo Kondo, chairman of the Japanese House of Representatives Science and Technology Committee, who is currently visiting Beijing. He did not disclose details on the matter, saying only that the accelerator being developed is "small." Observers believe, however, that China is engaged in the development of a proton synchrotron.

During the meeting Fang also told Kondo that China will continue to carry out its energy policy with emphasis laid on water power and coal and explained it does not plan to lay stress on nuclear power generation.

CSO: 5100/2144

SOUTH KOREA

BRIEFS

SECOND POWERPLANT TO OPEN--Seoul, April 10 (YONHAP)--South Korea's second atomic power plant with a capacity of 678,000 kilowatts will begin operations by the end of the year, government sources said Saturday. The plant, equipped with Canadian-made nuclear reactors, is being built at the industrial town of Wolsong in southeastern Korea at cost of about 928.5 million U.S. dollars. Construction began in October 1977. South Korea's first nuclear plant at Kori on the southeast coast is now in operation with a capacity of 590,000 kilowatts. The nuclear industry is a priority in the South Korean Government's plan to develop substitute sources of energy. [Text] [SK100840 Seoul YONHAP in English 0741 GMT 10 Apr 82]

CSO: 5100/2144

CNEA OFFICIAL, SOVIET COMMENT ON URANIUM DEAL

PY071902 Buenos Aires TELAM in Spanish 1808 GMT 6 Apr 82

[Text] Buenos Aires, 6 Apr (TELAM) -- An important contract for the supply of 100 kg of 20 percent enriched uranium was signed today between the National Atomic Energy Commission [CNEA] and the autonomous self-financed Soviet foreign trade company, Tekhsnabeksport.

The document was signed by CNEA Chairman Vice Adm Carlos Castro Madero and by Viktor Ivanovich Zharikov, deputy general director of the Soviet company Tekhsnabeksport, in the presence of Soviet Ambassador Sergey Striganov, high-ranking Foreign Ministry officials and members of the Soviet Embassy in Buenos Aires.

Castro Madero stated that this contract involves a development of nuclear relations with the Soviet Union, and it is the first step toward more important ones, which will allow Argentine development in the nuclear field.

Zharikov, in turn, admitted the importance of this contract, not so much because of the volume, but because it can open the path which may increasingly strengthen relations at this level between the two countries.

Finally, asked about the current conflict between our country and Great Britain, Soviet Ambassador Striganov limited himself to saying that he would rather speak at this moment about the nuclear contracts.

Questioned further, he stated that the Soviet Union abstained from voting against Argentina because it believes that sovereignty over the Malvinas Islands must be discussed at the United Nations because of its colonialist characteristics. I hope that everything will be solved peacefully, he added.

CSO: 5100/2144

USSR TO SUPPLY ENRICHED URANIUM TO ARGENTINE

OW071248 Beijing XINHUA in English 1236 GMT 7 Apr 82

[Text] Buenos Aires, April 6 (XINHUA) -- The Soviet Union is expected to replace the United States as a supplier of enriched uranium for Argentina, according to three agreements on nuclear raw materials signed by the Soviet Union and Argentina here today. Under these agreements, the Soviet Union will provide Argentina with heavy water and 100 kilograms of enriched uranium in return for four tons of the latter's concentrate uranium ore. The Soviet enriched uranium will be used in two nuclear reactors in Argentina while the heavy water will be used to make up for the losses of the nuclear power station in Atucha in its daily operation.

Argentina reportedly got enriched uranium from the United States in the past. However, the United States stopped its supply because Argentina refused to sign the nuclear nonproliferation treaty.

Trade between Argentina and the Soviet Union has grown rapidly in recent years. In 1981, 75 percent of Argentina's exported grain went to the Soviet Union. Argentina also had 3.418 billion dollars of favorable balance of trade between the two countries last year. During the first quarter this year, the Soviet Union bought 7 million tons of Argentine grain, 2.5 million tons more than that specified by agreement. It is estimated that the Soviet Union will buy 20 million tons of grain from Argentina this year while seeking to export chemical products, electric generators, turbines and heavy water to that country.

CSO: 5100/2144

DEVELOPMENT OF NUCLEAR INDUSTRY URGED

Jiddah ARAB NEWS in English 11 Mar 82 p 1

[Text] DOHA, March 10 (AFP) — Arab countries should coordinate their efforts to develop a pan-Arab electro-nuclear industry which would be under their full control at every stage, several delegates told the second Arab energy conference here Wednesday.

The Vice Secretary General of the Organization of Arab Petroleum Exporting Countries (OAPEC) Adnan Mustafa has stressed that Arab countries cannot obtain nuclear fuel from elsewhere in the world for political reasons.

The development of an Arab electro-nuclear industry will depend on uranium reserves in Arab countries, he said. The Arab world has proven uranium reserves of 60,000 tons in Algeria, Egypt, Morocco, and Somalia.

Two Kuwaiti scientists, Adnan Chinab-Eldin and Yousif Rashid, stressed that the Arab world is trailing in the nuclear field. With the exception of Egypt, Iraq and Algeria, and "perhaps" of Libya, nuclear technology was "virtually absent from Arab countries", they said.

They added that while the Arab world was experiencing "relative prosperity" in the energy sector, it was necessary to develop a nuclear industry to prepare for the years when the oil was exhausted.

They noted that unless a country became totally aligned on the United States, politically, commercially and militarily, it was virtually impossible to acquire American nuclear reactors.

The attitude of Europe was "more objective" as was shown by an agreement between France and Iraq, they said. They suggested that "the power of oil in negotiations" should be used to obtain nuclear technology for peaceful purposes.

During a subsequent debate, an American, Richard Wilson, who is a professor at Harvard University, suggested that industrialized countries' radioactive waste could be buried in he desert in Egypt or Saudi Arabia in return for technology such as port installations.

But this provoked a strong reaction from Arab delegates. One delegate retorted: "Why not choose the Nevada Desert?"

Gebeily, a prominent nuclear authority in Egypt, said the Egyptian government recently turned down a proposal by Austria to dispose of its nuclear waste in the Egyptian desert on both sides of the Nile.

CSO: 5100/4715

BRIEFS

NUCLEAR AGREEMENT--The Consultative Council met today under the chairmanship of Council Speaker Dr Subhi 'Abd al-Hakim and approved the agreement signed between Egypt and the International Atomic Energy Agency [IAEA] on the application of the guarantees connected with the treaty for the nonproliferation of nuclear weapons. The agreement stipulates that the IAEA take every precaution to safeguard commercial and industrial secrets as well as other prohibited information reaching it. [Excerpt] [NC121547 Cairo Domestic Service in Arabic 1500 GMT 12 Apr 82]

CSO: 5100/2144

BRIEFS

NUCLEAR POWER STATIONS--The heads of the nuclear engineering department at the Technion yesterday said in Haifa that in their view it is feasible to extablish nuclear power plants in Israel even without Israel signing the international convention against the proliferation of nuclear arms. At a press conference conducted in anticipation of a conference of the nuclear societies in Israel, which is to take place next week at the Technion, the spokespersons--professors Amos Nota, Naphtali Shafrir and Yitzhaq Segal--said that in their opinion a good portion of what is required to set up a nuclear power plant will come from domestic development and manufacture, and additional elements may be acquired at various places throughout the world. The spokespersons called upon the government to formulate policy and to prepare a multi-year plan on this matter, including the administration of a project to explore the ways to set up the first nuclear power plant in Israel. Heretofore, they said, the government of Israel has not formulated policy in the area of nuclear energy. However, there is no doubt that it is inevitable, since, sooner or later, Israel will have to build a nuclear power plant. The professors noted that the Technion is prepared to train personnel for the planning and construction of power plants. [By Tzvi Tal, Correspondent in Haifa] [Tel Aviv YEDI'OT AHARONOT in Hebrew 11 Feb 82 p 4] [Text] 8090

CSO: 5100/4709

BRIEFS

URANIUM PROSPECTS FOR 1990's--Niger could become fourth in the league table or uranium producers in the world, overtaking Namibia by 1990, according to a recent announcement at the UN in New York. The United States is the world's largest producer, followed by Canada, South Africa, Namibia, Niger and France. Niger overtook France in 1979. The London-based Uranium Institute agreed that Niger would be well placed to take and hold the number four position if the price holds up. Production in 1980 is estimated at 4,100 tonnes and provisional figures for 1981 showed an increase to 4,400 tonnes. The bulk of the increased production, which would take Niger to about 10,000 tonnes by 1993, would come on stream when, analysts predict, demand for uranium will improve. World stocks are very high at the moment, partly because of the oil glut which has discouraged demand for the metal. But by the early 1990s it is expected that demand for electricity and the price of oil will have increased sufficiently for demand for uranium to increase. [Text] [London WEST AFRICA in English No 3374, 5 Apr 82, p 955]

CSO: 5100/5642

BRIEFS

URANIUM MINING TREATY PLANNED--Bulawayo.--A treaty between Zimbabwe and Mozambique on the exchange of information on mining and border exploration of minerals such as uranium, is being considered. Zimbabwe's Secretary for Mines, Mr Christopher Ushewokunze, hopes to establish an umbrella agreement on mining with the Mozambicans. This is just one of the future trends in mining for Zimbabwe, according to Mining and Engineering, which interviewed the Minister after his recent trip to Mozambique with the Prime Minister, Mr Robert Mugabe. Mr Ushewokunze said mineral deposits extending across the borders of the two countries would be more easily mined if the governments co-operated.--Sapa. [Text] [Johannesburg THE CITIZEN in English 13 Apr 82 p 13]

CSO: 5100/5643

BRIEFS

PRO-NUCLEAR COMMITTEE FORMED--The introduction of nuclear power as soon as possible is important in order for Denmark to retain its competitive power and its welfare. This statement was made by the newly formed "Committee for the Introduction of Nuclear Power in Denmark," which has just sent out a cassette tape with Professor of Reactor Physics, P. L. Ølgård. Behind the committee are Erik Tillisch, Lord of the Bedchamber, Rosenfeldt, Bernt Johan Collet, squire and M.P., Lundbygaard, Knud Olesen, merchant, Th. Olesen, Inc., J. Sønderholm, the Commercial Bank, David Gress, author, Stege, Thorvald Kortbæk, director, Copenhagen, Jens Chr. Rotbøll, president of association, and Eigil Osted, director. Bernt Johan Collet tells BERLINGSKE TIDENDE that the committee is neither a competitor of Danatom nor of REO but a supplement. "We feel that it is possible to provide information on nuclear power in an objective and proper way," the squire says with reference to the cassette tape just sent out. On the committee, he says that it is composed of some people who intend to spend part of their spare time on the work for nuclear power and who consider the economic aspects to be so important that they are willing to work for it. "Cheap energy is not only important for our competitive power but for our welfare and has a direct effect on the economy of the individual citizen," says Bernt Johan Collet, who, moreover, considers the problems of pollution caused by coal-firing to be so serious as to demonstrate the advantage of nuclear power. [Text] [Copenhagen BERLINGSKE TIDENDE in Danish 1 Apr 82 p 6] 7262

CSO: 5100/2130

FRANCE

EXPERIMENTS WITH CARAMEL FUEL IN OSIRIS REACTOR DESCRIBED

Paris REVUE GENERALE NUCLEAIRE in French No 6 Nov-Dec 81 pp 567-576

[Article by Jean-Marie Cerles, Chief of Osiris reactor operations, CEA; and Ghislain de Contenson, engineer in the Technology Department, CEA]

[Text] After a presentation of the Caramel fuel to be used in the Osiris reactor, the authors describe the first experimental phases of the use of this fuel in the reactor. They then analyze the behavior of the fuel and its consequences for operational purposes.

Starting in the 1960s and until the present time, the many research reactors all over the world have used highly enriched fuel. The choice of this type of fuel, which offers some technical advantages, was made possible because the United States made the necessary fuel available. The technical advantages of this fuel are quite obvious: the very low amount of highly enriched uranium required can be placed in a low density matrix. In the present case, a uranium and aluminum alloy is used to produce fuel elements consisting of thin plates. These fuel elements are perfectly suited for producing the high specific powers associated with the high neutron flows needed for these reactors.

This dissemination of large amounts of highly enriched uranium led to a growing awareness of the associated dangers of proliferation, and during the 1970s, a movement developed, tending to restrict the supply of highly enriched uranium. Then there arose the problem of converting the highly enriched fuel used in research reactors into a slightly enriched fuel, with the upper limit for enrichment set at 20 percent U 235.

While research and development programs for the production and qualification of fuels that could be used for slightly enriched fuels were being set up in a number of countries, such as the United States, Germany, and France (CERCA [Company for the Study and Manufacture of Atomic Fuel]), in 1977 the CEA [Atomic Energy Commission] decided to conduct an experiment using slightly enriched fuel with the Osiris reactor at Saclay. The technology for such an experiment, developed at the CEA, was already available. This fuel, known by its generic name of Caramel, consists of uranium oxide strips, whose thickness can vary, encased in zircaloy and assembled to form plates. By using this fuel, the problem of increasing the density of the uranium matrix necessary for the reduction of enrichment was resolved: 9 g U/cm^3, compared with 1.6 g U/cm^3 in the U-Al alloy.

The Osiris reactor has been using this new fuel for nearly 2 years now (it began in January 1980). This experiment has provided a very complete and strict test; its duration has now been long enough to produce meaningful results in the following areas: operating conditions, consequences for testing, behavior and monitoring of the fuel.

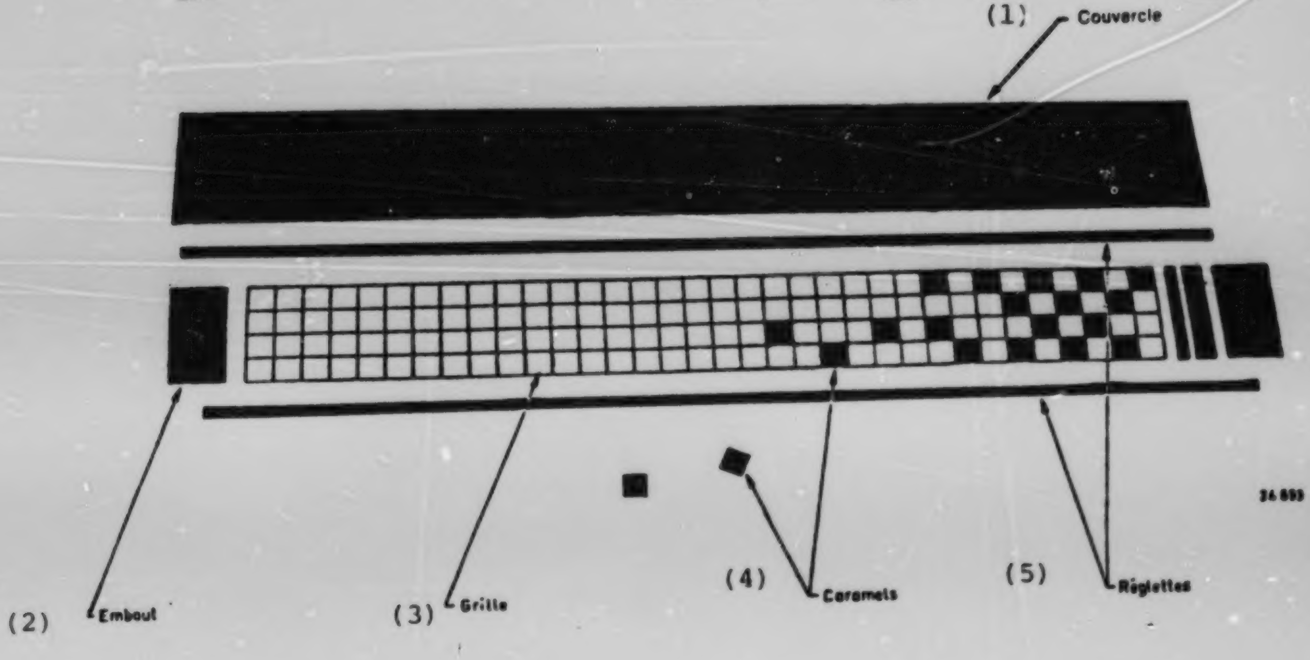


Figure 1: Elements of a Caramel plate.

Key for Figure 1:

1. Lid
2. Tip
3. Grid
4. Caramels
5. Side strips

I The Caramel Fuel

1.1. Presentation

One result of the various programs conducted in France for the design, manufacture, and development of nuclear fuels has been the CEA's development of a uranium oxide fuel (called the Caramel fuel) whose characteristics and performance are essentially quite different from those of the conventional rod or pencil type of fuel. Thc Caramel fuel is distinguished from the conventional type of nuclear fuel by the following features:

a. Its plane geometry;

b. The lack of any free volume;

c. Good contact between the oxide and the protective shield (absence of any clearance);

d. The splitting of the fuel into a large number of compartments, all tightly sealed in relation to each other.

The basic element of the Caramel fuel is in the shape of a plate, formed by two zircaloy sheets which act as lids. Between these sheets are the strips of UO_2, which are themselves arranged in the cavities of a grid. The plane geometry is an effective way to convert the disadvantage of the poor conductivity of uranium oxide into an advantage, by combining a high specific power with a low fuel temperature.

Because of their use in water-cooled reactors, the components of the Caramel fuel--the UO_2 and the zircaloy--are very well known in terms of their physical properties, their behavior under irradiation, their manufacture, etc.

The special features of the Caramel fuel do require particular operating conditions. Because of the lack of free volume (except for the open porosity of the fuel), the temperature at which fission gases begin to be released must never be exceeded. For this reason, it is essential to have excellent contact between the oxide and its covering from the very start; this contact should last for the entire life of the fuel element. The manufacturing methods described later can ensure the good quality of this contact.

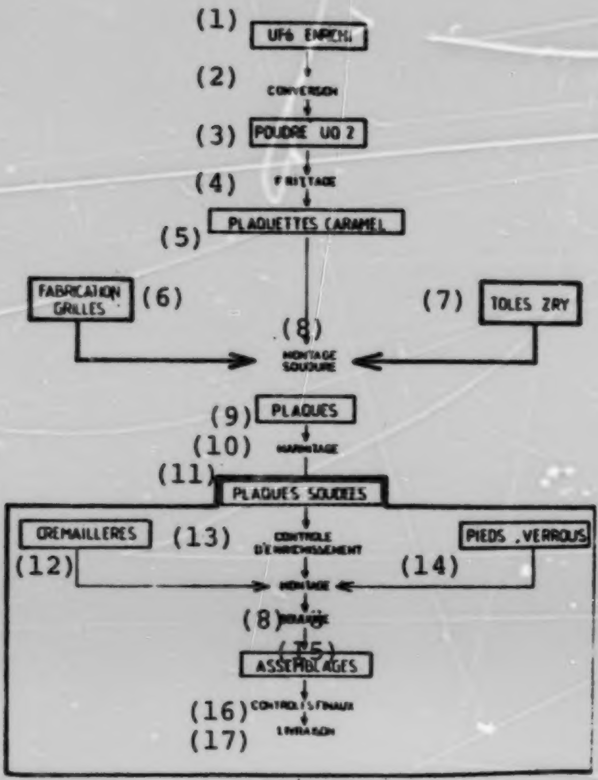

(1)
UF6 ENRICHI
(2)
CONVERSION
(3)
POUDRE UO 2
(4)
FRITTAGE
(5)
PLAQUETTES CARAMEL
FABRICATION GRILLES
(6)
(7)
TOLES ZRY
(8)
MONTAGE SOUDURE
(9)
PLAQUES
(10)
MARINTAGE
(11)
PLAQUES SOUDEES
CREMAILLERES
(12)
(13)
CONTROLE D'ENRICHISSEMENT
PIEDS , VERROUS
(14)
MONTAGE
(8)
BRASAGE
(15)
ASSEMBLAGES
(16)
CONTROLES FINAUX
(17)
LIVRAISON

Figure 2: Manufacturing schematic for the Caramel fuel.

Key:

1. Enriched UF_6
2. Conversion

3. UO_2 powder
4. Pressing
5. Caramel strips
6. Manufacture of grids
7. Zircaloy sheets
8. Assembly/soldering
9. Plates
10. "Shelling" [form of soldering]
11. Soldered plates
12. Racks
13. Enrichment control
14. Feet, bolts
15. Assemblies
16. Final controls
17. Delivery

The splitting of the fuel into a large number of tight compartments is a major safety factor. Because of its dispersion, any possible loss of seal only puts a small amount of fissile material in contact with the coolant, which limits any possible contamination of the primary circuit.

The operating temperature, well below the temperature at which fission gases begin to be released, is another safety factor.

The first studies done at the CEA were oriented toward such applications as electricity or heat-generating reactors and naval propulsion reactors, and these used very thick Caramel (4 mm), because the specific powers required were limited. The thin Caramel, which was developed later, has been used in the Osiris research reactor, for which very high specific powers are needed (the average value is approximately 1,640 W/cm^3, and the maximum value is 4,300 W/cm^3).

Table 1 lists the main features of the reactors which are operational or planned (such as the Thermos reactor) with Caramel plate fuels.

1.2. Description of the Osiris Fuel

The basic module of the Osiris fuel element of the Caramel type is a plate 700 mm long, 80 mm wide, and 2.25 mm thick. Figure 1 lists its various components. The UO_2 fuel is pressed into a parallelopiped with a square section of 17.1 x 17.1 mm and 1.45 mm thick. These strips are arranged in the cavities of a grid and encased between two sheets of zircaloy. This unit, fitted with side and end pieces made of zircaloy, undergoes a series of soldering procedures in order to ensure the perfect seal of each UO_2 strip in relation to the outside and in relation to its nearby strips. These manufacturing procedures are described later.

Réacteur (1)	Puissance (MW) (2)	Epaisseur CARAMEL (mm) (3)	Température gaine (°C) (4)	Pression réfrigérant (bars) (5)	(6) Puissance spécifique moyenne (W/cm^3)	(7) Puissance spécifique maximale (W/cm^3)
Pile piscine (OSIRIS) (8)	70	1,45	140	3	1 640	4 300
Calogène (THERMOS (9)	100	2,25	160	11	275	1 070
ISIS	0,7	1,45	95	1,5	16	43

Table 1: Principal Features of Operational or Planned Reactors Using Caramel Fuel

Key:

1. Reactor
2. Power (MW)
3. Caramel thickness (in mm)
4. Temperature of casing (°C)
5. Coolant pressure (bars)
6. Average specific power (W/cm^3)
7. Maximum specific power (W/cm^3)
8. Swimming pool reactor (Osiris)
9. Heat-generating reactor (Thermos)

Clusters are formed of 14 or 17 parallel plates, which are kept joined by slotted side pieces. They are fitted with a base or foot to provide a water supply, and a head for handling.

Table 2 lists the main features of an Osiris fuel element. These features are shown in comparison with those of a highly enriched uranium fuel element, whose structures are made of aluminum.

The essential differences consist of:

a. The metallurgical nature of the fuel: UO_2 instead of U-Al alloy;

b. The nature of the enclosure and structures: zircaloy instead of aluminum;

c. The thickness of the plates: 2.25 mm instead of 1.27 mm;

d. The total amount of uranium, which is considerably increased.

Type d'élément combustible (1)	(2) Nombre de plaques	Epaisseur d'une plaque (3) (mm)	Epaisseur du canal d'eau (4) (mm)	Charge en uranium (5) (kg)	Charge en U 235 (6) (kg)
Elément à uranium très enrichi U-Al (7)					
Elément standard (8)	24	1,27	2,1	0,420	0,390
Elément de commande (9)	20	1,27	2,1	0,282	0,262
Elément CARAMEL (10)					(7 %)
Elément standard	17	2,25	2,6	8,6	0,602
Elément de commande	14	2,25	2,8	5,3	0,371

Table 2: Comparison of Highly Enriched Uranium Fuel Element and Caramel Fuel Element for the Osiris Reactor

Key:

1. Type of fuel element
2. Number of plates
3. Thickness of plate (mm)
4. Thickness of water supply ducts (mm)
5. Amount of uranium (kg)
6. Amount of U 235 (kg)
7. Highly enriched uranium U-Al element
8. Standard element
9. Control element
10. Caramel element

The amount of fissile uranium (U 235) also had to be increased in order to compensate for absorptions caused by the U 238.

1.3. Manufacturing and Quality Control

1.3.1. Manufacture of Strips

The manufacturing of the Caramel fuel is done in facilities belonging to the CEA or to its subsidiaries. Some components, such as the zircaloy sheets, and cast or machined parts, are provided by industry. The manufacturing schematic is given in Figure 2.

The following manufacturing phases can be distinguished.

Production of oxide strips (Caramel). The oxide strips are made by pressing UO_2 powder, using moisture. The process used is called the DCN (Double Normal Cycle). The pressing is done under hydrogen, at a temperature close to 1,600°C. The density of the pressed Caramel is equal to 94 percent of the theoretical density.

We should mention that the production of Caramel fuels benefits from the experience acquired in this field with PWR [Pressurized Water Reactors] fuels.

Deposit of Antidiffusion Barrier

Each Caramel is covered with a layer of chrome, deposited by cathode pulverization. This chrome acts as a barrier, preventing the diffusion of oxygen in the zircaloy, which could take place during the process of soldering by diffusion, which is also called "shelling," and is described later.

1.3.2. Manufacture of Plates

The following elements are combined to form a plate (Figure 1):

a. oxide strips;

b. zircaloy grid, made by soldering zircaloy wires;

c. a nickel tip, which has an effect on the neutrons;

d. side pieces made of zircaloy;

e. end pieces, also made of zircaloy; and

f. zircaloy sheets used as enclosures.

The Caramel are placed in the grid cavities. The entire unit--the grid with its Caramel fuel, the side pieces, the end pieces, and the tip--is placed between two sheets of zircaloy, and soldered to form a tight seal. The plate closing procedures are done in the following order:

a. After resistance soldering of the various parts, the sides are soldered to the roller, using a resistance solderer;

b. The end pieces are then soldered by electron bombardment, which also places the unit in a vacuum;

c. After the plate is closed in this way, it is transferred to a diffusion soldering enclosure, where it undergoes a high temperature ($\sim$800°C) and high pressure ($\simeq$1,000 bars) treatment for 4 hours; this procedure is also called "shelling." This process ensures that all the zircaloy components, especially the grids and sheets, are properly soldered, separating each strip of UO_2 and ensuring a good contact between the oxide and the enclosure sheet.

d. This shelling process is then followed by a control procedure, done in a vacuum at 700°C.

1.3.3. Quality Control

All the materials and components must meet the stringent specifications: specific control procedures have been established, and a quality control organization has been set up.

These controls are done at all phases of production, and cover in particular:

a. Measurement of components and assembly (measurement of ducts);

b. Enrichment of each fuel strip;

c. The quality of soldering between metal parts;

d. The quality of the contact between the oxide and the enclosure.

These controls are done during the manufacturing process in the following manner.

1.3.3.1. Controls during the Production of Basic Elements

UO_2 strips: measurement (length, width, thickness, density, appearance, control of chrome deposit).

The tolerable surface density defects have been defined on the basis of correlations between the dimensions of the defect and the residual thickness of the sheet after diffusion soldering.

Zircaloy parts: measurement. Surface condition after abrasion.

1.3.3.2. Controls of finished plates

a. appearance;

b. measurement;

c. control of absence of entrapped gases, by thermal treatment at 700°C in a vacuum, with the plates free;

d. control of quality of soldering by micrography and corrosion testing;

e. enrichment controls.

The enrichment control of the Caramel plates consists of determining the surface content of U 235 by neutron measurement. This control offers a number of advantages:

a. overall control of the various manufacturing tolerances of the Caramel elements;

    1. enrichment;

    2. uranium titer in the UO_2;

    3. density of the pressed UO_2;

    4. thickness of the Caramel;

b. possibility of a systematic control of all the strips which combine to make up a fuel element;

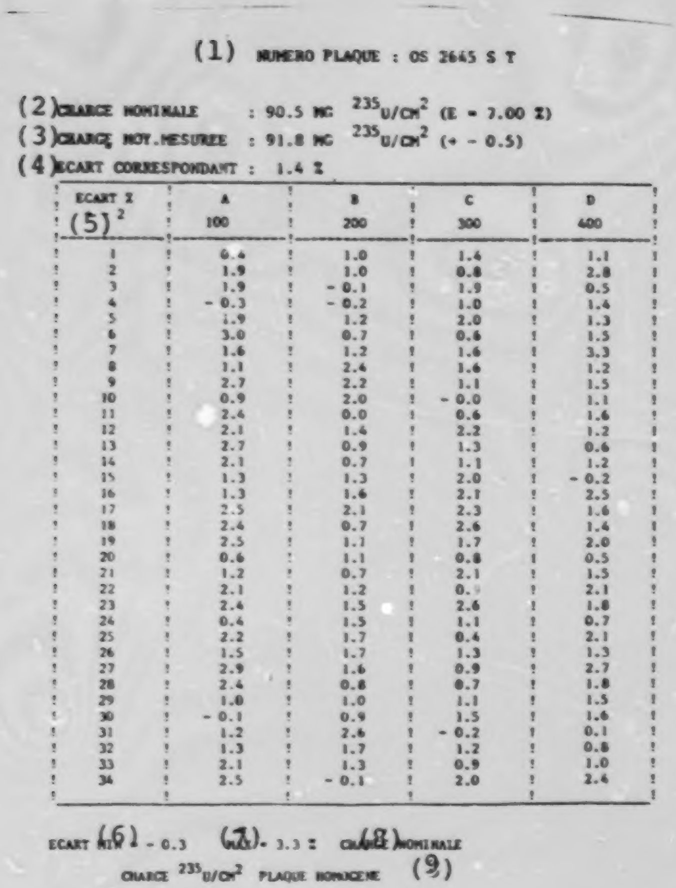
c. speed of control in relation to conventional methods;

d. exact measurement of the combined manufacturing variances;

e. control of a characteristic (surface content of U 235) that can be used directly to calculate the reactor's performances; and

f. control of the quality of the oxide-enclosure contact.

The quality of the oxide-enclosure contact appears to be an important parameter in the design of the Caramel fuel. A method of thermal analysis by infrared thermovision has been developed.



(1) NUMERO PLAQUE : OS 2645 S T

(2) CHARGE NOMINALE : 90.5 MG $^{235}U/CM^2$ (E = 7.00 %)
(3) CHARGE MOY.MESUREE : 91.8 MG $^{235}U/CM^2$ (+ - 0.5)
(4) ECART CORRESPONDANT : 1.4 %

ECART % (5)	A 100	B 200	C 300	D 400
1	0.4	1.0	1.4	1.1
2	1.9	1.0	0.8	2.8
3	1.9	- 0.1	1.9	0.5
4	- 0.3	- 0.2	1.0	1.4
5	1.9	1.2	2.0	1.3
6	3.0	0.7	0.6	1.5
7	1.6	1.2	1.6	3.3
8	1.1	2.4	1.6	1.2
9	2.7	2.2	1.1	1.5
10	0.9	2.0	- 0.0	1.1
11	2.4	0.0	0.6	1.6
12	2.1	1.4	2.2	1.2
13	2.7	0.9	1.3	0.6
14	2.1	0.7	1.1	1.2
15	1.3	1.3	2.0	- 0.2
16	1.3	1.6	2.1	2.5
17	2.5	2.1	2.3	1.6
18	2.4	0.7	2.6	1.4
19	2.5	1.1	1.7	2.0
20	0.6	1.1	0.8	0.5
21	1.2	0.7	2.1	1.5
22	2.1	1.2	0.9	2.1
23	2.4	1.5	2.6	1.8
24	0.4	1.5	1.1	0.7
25	2.2	1.7	0.4	2.1
26	1.5	1.7	1.3	1.3
27	2.9	1.6	0.9	2.7
28	2.4	0.8	0.7	1.8
29	1.0	1.0	1.1	1.5
30	- 0.1	0.9	1.5	1.6
31	1.2	2.6	- 0.2	0.1
32	1.3	1.7	1.2	0.8
33	2.1	1.3	0.9	1.0
34	2.5	- 0.1	2.0	2.4

ECART (6) MIN = - 0.3 (7) MAX = 3.3 % CHARGE (8) NOMINALE
CHARGE $^{235}U/CM^2$ PLAQUE HOMOGENE (9)

Figure 3: Caramel plates: Example of control of content of U 235/cm^2.

Key:

1. Plate number: OS 2645 S T
2. Nominal content
3. Average content measured
4. Corresponding variation
5. Percentage of variation
6. Minimum variation
7. Maximum variation
8. Nominal content
9. 235 U/cm^2 content; homogenous plate

However, this method is not being used now, for the test done at 700°C in a vacuum can be used to test the plates under conditions which are more stringent than the conditions of operation in a pool reactor. Until the present, this test has been found to be highly satisfactory.

1.3.3.3. Control during the final assembly

a. overall measurement of the assembly (by placement in a standard measurement gauge);

b. measurement of all ducts;

c. control of superficial pollution.

The controls and final acceptance are handled by an organization independent of the fuel manufacturer. Moreover, a system of quality assurance has been set up and works with studies, development, and testing.

A descriptive file is drawn up for each fuel assembly. These records contain all the data for the assembly:

a. data concerning the various componenets: source, method of production, mechanical characteristics, measurements and weight, chemical analyses;

b. measurement results for each plate;

c. observations after a visual examination of each plate;

d. results of the enrichment control, done for each strip;

e. results of the measurement of all water ducts (a recording is made for each row of strips).

Figure 3 gives some examples of the data compiled for each fuel assembly, and contained in this descriptive file.

1.3.4. Manufacturing Experience

The experience acquired during manufacturing is based on the development of a large number of assemblies, in addition to the production of units for experimental irradiations. Table 3 gives a summary of this experience.

(1) Réacteur	(2) Nombre d'assemblages	(3) Nombre de plaques	(4) Nombre de plaquettes UO_2	(5) Poids UO_2 (kg)
(6) PAT (*)	16	576	101 952	1 497
(7) CAP (**)	4	44	13 728	192
OSIRIS	> 200	3 400	462 400	2 019

Table 3: Assemblies produced

1. Reactor
2. Number of assemblies
3. Number of plates
4. Number of UO_2 strips
5. UO_2 weight (kg)
6. Ground Prototype: PWR type reactor used as a prototype for naval propulsion, located at Cadarache.
7. Advanced Boiler Prototype: PWR type reactor with a power of 100 thermal MW, also located at Cadarache.

At present, the production capacity is 200 assemblies of the Osiris type a year.

1.4. Qualification of the Caramel Fuel

1.4.1. Various Qualification Programs for the Caramel Fuel

A broad testing and qualification program for the Caramel fuel has been undertaken and executed within a broad range of specific powers and combustion ratios. Its purpose was to determine first of all the technological limits, then the safe and reliable areas of operation of this type of fuel. This program includes both parametric tests in irradiation test circuits in test models with a limited number of Caramel elements, and irradiations of experimental assemblies done in the Osiris reactor and in the CAP and CAT prototype reactors.

Following are the major outlines of this program, as well as the principal results that have been obtained.

1.4.1.1. The EL 3 Program

A first exploratory program designed to determine the technological limits of the fuel was begun at Saclay in the EL 3 reactor between 1965 and 1970. It worked with 17 irradiation test units (including five or nine Caramel each) which were irradiated with variable combustion ratios and specific powers.

The range of specific power explored extends from 1,000 to 3,000 W/cm^3. The enclosure temperature: 280°C to 340°C. The results of these tests showed that:

a. It is possible to achieve combustion ratios of 30,000 MWj/t with specific powers as high as 3,000 W/cm^3 without damaging the fuel. Beyond 30,000 MWj/t, if this specific power is maintained, there is a danger of causing the strips to swell, thus releasing gases. This would not necessarily cause the enclosures to break.

b. On the other hand, if the specific power is decreased at this stage of irradiation, it is possible to reach combustion ratios up to 50,000 MWj/t without any notable change in the structure of the UO_2 strips.

1.4.1.2. Siloe Program

Two irradiations without external pressure were conducted in the swimming pool reactor, Siloe, at Grenoble, using two small units with a few test models each.

The irradiation conditions were as follows:

Specific power	1,060 W/cm^3		1,500 W/cm^3
Duration	245 days	and	202 days
Combustion ratio	18,300 MWj/t		25,100 MWj/t
Temperature	100°C		100°C

The results obtained show a very good behavior of the assemblies in the reactor and a very good appearance after irradiation.

1.4.1.3. Program of Experimental Irradiations in the Osiris Reactor

These are still experimental irradiations of test units, each with several Caramel, and should not be confused with the irradiations of Osiris elements done in actual size. The irradiations were done in an NaK container at a temperature of 300°C with external pressurization of 140 bars.

Historically, two series of irradiations were done:

a. In 1973-1974, with Caramel thicknesses of 3 and 4 mm;

b. In 1975-1978, with just a thickness of 4 mm; the objective was to determine the technological operating limits.

The test units in the first series exceeded 40,000 MWj/t with a thickness of 3 mm and 37,500 MWj/t with a thickness of 4 mm. The examinations conducted revealed the absence of any release of gases and the very good behavior of the separators.

The results cover in particular:

a. The thermal conductance of the uranium oxide as a function of the combustion ratio;

b. The determination of the extreme limit for the normal operational temperature ;

c. The extreme temperature of the separators;

d. The operating limits for the two thicknesses of 3 and 4 mm during operation.

Figure 4 gives an example of the operational limit for a Caramel 4 mm thick up to a mass combustion of 50,000 MWj/t U. If we know the extreme temperature for the fuel operation, it is possible to transpose these results to other Caramel configurations. So, in the case of the Osiris reactor, the extreme specific powers would be above 5,000 W/cm^3.

Other test irradiations were done in a loop on the Osiris reactor. Two irradiations were done as part of the Irene program, using a pressurized water loop which reproduced the real coolant conditions. One of them caused a leak detection signal due to the instrumentation (passage of thermocouples). This was used for safety studies (Ir-06). The second concerned the study of deposits of corrosion products. Moreover, power cycling tests were done, still using the 4 mm-thick Caramel, before the shutdown of the Osiris reactor in July 1978, on test models which reached a combustion ratio of 30,000 MWj/t. These cyclings were done under the following conditions:

a.	high level	1,250 W/cm^3
b.	low level	375 W/cm^3
c.	speed of rise and descent	400 W.cm^{-3}/mm^{-1}
d.	number of cycles	3,634

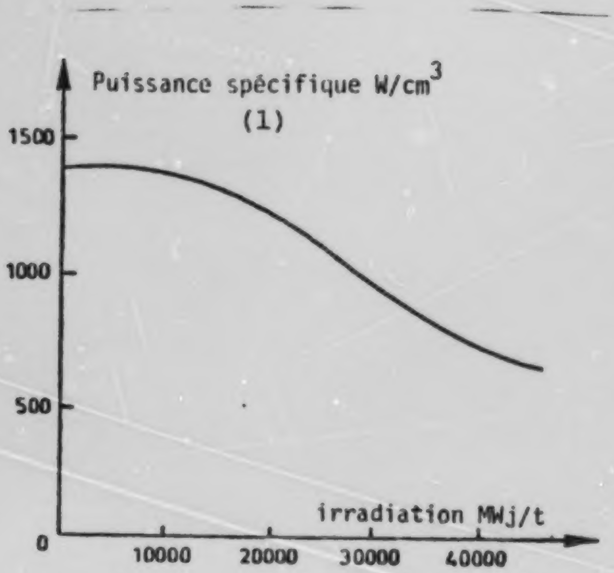


Figure 4: Operational limit for a Caramel 4 mm thick

Key:
1. Specific power W/cm^3

1.4.2. Carine Experiment: Study of Fuel Shield Rupture in Osiris

In order to evaluate the safety in operation of such a fuel in relation to the risks of a release of fission products or fissile matter in the primary circuit of the slightly pressurized reactor, a test of a shield rupture was done under conditions representative of the Osiris operation. This test was conducted in the independent test loop of the EL 3 reactor. This loop, located in the heavy water tank, is a heavy water cooling circuit distinct from the reactor's circuit. Thus, any possible pollution of heavy water is limited to this circuit.

1.4.2.1. Test Conditions

The fuel element, which was produced according to the same process as the standard fuel element, contained 32 strips of UO_2 enriched to 7 percent. The shield defect was a circular hole with a surface of approximately 1 mm^2. The specific power during irradiation was raised to 3,050 W/cm^3. Cooling was provided by the circulation of heavy water at a flow rate of 10 m/s. These conditions are quite similar to those in Osiris.

The fuel plate was placed in an aluminum case channeling the water to both sides of the fuel plate in order to provide adequate cooling.

The power released in the fuel was obtained by thermal records. The rise in the cooling water temperature was measured by a triple probe placed at the intake of the assembly in the reactor and by three triple thermocouples placed at the outlet. The flow rate was measured by a meter placed on the circuit.

Detection of the shield rupture was done by two parallel systems. One used a BF 3 counter which was normally in use on the loop, while the other was equipped with a ^{3}He counter similar to the one installed in Osiris.

1.4.2.2. Test Results

Changes in the DND (Delayed Neutron Detection) signal as a function of time are shown in Figure 5. We notice the presence of three pseudo-plateaus corresponding to increasing levels of activity. Their duration is about 5 hours for the first, 30 hours for the second, and 3 hours for the third. During the duration of the first two pseudo-plateaus, there were bursts of activity reaching peaks whose amplitude was close to the average signal.

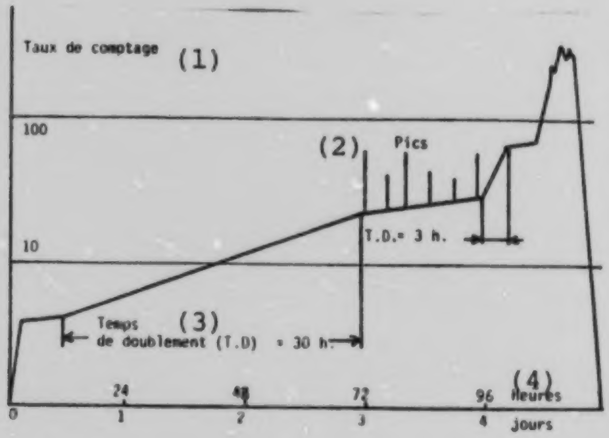


Figure 5: Changes in the Counting Rate of Neutrons Delayed during Irradiation

Key for Figure 5:

1. Counting rate
2. Peaks
3. Doubling time
4. Hours/days

Then there was an abrupt signal acceleration following an exponential curve.

The time required for the signal to double--30 hours during the first phase--was only 3 hours during the second phase.

After the third pseudo-plateau, there were recorded peaks of activity, with the average signal first changing rapidly and then stabilizing for 1 hour 40 minutes.

The delayed neutron detection equipment used was representative of the device installed in the Osiris reactor, which permits a determination of the time necessary for reaching the detection threshold of a shield rupture. The results indicate that the detection threshold is exceeded after the third pseudo-plateau.

Despite the continuation of irradiation in these conditions for about 2 hours, we found a very low level of radionucleid activity indicating a fuel leak. Moreover, the examinations made of the test fuel element after irradiation showed an absence of any significant change in the opening initially made and in the underlying fuel.

This test therefore showed the excellent behavior of the Caramel fuel in the event of a shield rupture, and also the possibility of detecting such a rupture in Osiris before any significant contamination of the reactor circuits could occur.

1.4.3. Irradiation of Three Complete Fuel Elements in Osiris

Before the start of service of the Osiris core, three precursor elements were irradiated in the old core. These irradiations were done during the first 6 months of 1978.

The first element put in the reactor was removed during the shutdown of the reactor for maintenance in July 1978, at an average irradiation level of about 18,000 MWj/t U. A destructive examination of this element was made at the Irradiated Fuels Research Laboratory at Saclay before the fueling of Osiris.

The other two elements were put in the reactor during the core fueling with Caramel fuel, for durations of one and two cycles, respectively, in order to actually have precursors, up to an average irradiation level of 18,000 to 20,000 MWj/t U.

II Changing the Fuel in Osiris

2.1. Refueling Schedule

The decision to conduct an operational experiment using slightly enriched fuel in Osiris was made in early 1977. The fuel chosen was the only one that would be available in the near future, the Caramel fuel. For the requirements of this operation, the thickness of the strips was reduced to 1.45 mm, as we said earlier.

The operation itself, with its main features: studies, work on the reactor, fuel testing, experimental studies, safety studies and reports, fueling and tests, took place following this schedule:

a. General studies, development of the fuel: 1977;

b. Testing of fuel elements in Osiris: early 1978;

c. Work on the Osiris reactor for the Caramel transformation: from autumn 1978 to the summer of 1979;

d. Isis safety report: January 1978;

e. Fueling of Isis and start of experimental studies on the core: October 1978;

f. Thermal studies on the loop in Grenoble: second half of 1978 to early 1979;

g. Osiris safety report: November 1978;

h, Fueling of the Osiris core: September 1979;

i. Tests of power increase: December 1979 to February 1980.

Note: The reactor was stopped at the end of July 1978 for the usual summer shutdown and for some major work, involving repairs of linings of the reactor (ducts, deactivation tanks), combined with work required for the change of fuel.

2.2. Adaptation of the Facility

The Osiris reactor was chosen for this experiment, involving the use of a slightly enriched fuel, because of its high performances. The fuel is thus placed in severe operating conditions which exceed the needs of all research reactors.

It is these conditions, combined with the fact that the Osiris reactor had no margin of U-Al fuel, beyond the margins required for safety, which explain to a great extent the need for certain modifications in the core's primary circuit. We should recall that the reactor had been originally designed for operation at 50 MW; the power of 70 MW was not reached until 1968, after a slight modification of the pumps.

The reduction in the number of plates per element (17 instead of 24) therefore had to be compensated for by an increase in the primary flow and thus by a change in the pumps and their motors.

As the primary circuit had four groups of exchangers and pumps operating in parallel in the U-Al core, each pump was associated with an exchanger. Three of these units were used simultaneously.

Because of the impossibility of increasing the flow in each of the exchangers simultaneously with the change in the pumps, a modification in the principal circuit allowed the four exchangers to be supplied in parallel from each of the four pumps. A main collecter now connects the outlet of the pumps to the intake of the exchangers. Only three of the pumps are used at the same time; the fourth remains on standby. However, the flow goes into the four exchangers.

The other adaptations made for operation with the Caramel fuel were very minor and were limited to a few reinforcements of the dry fuel storage facility.

The modification of the DRG [Shield Rupture Detection System] had already been considered for the U-Al fuel. In the former situation, the DRG only gave an alarm signal and only used a detection system for delayed neutrons. The modification made consisted of introducing the DRG in the sequence of protective actions for the signal caused by delayed neutrons (action at 2/3) and adding a measurement of the gamma signal.

2.3. Experimental Studies

In addition to the irradiations and tests of the fuel, a major experimental program was used to support the core transformation:

a. A study of the core with the Isis reactor, starting in October 1978, a year before the fueling of Osiris;

b. A study of the hydraulic behavior, loss of load and vibrations, and of the fuel element in a test loop at Saclay;

c. A study of the thermal behavior of the duct at Grenoble.

2.3.1. Experimental Study of the Core

This study, done on the Isis, was designed to verify the data for the core, which are highly important for safety, and to determine the neutron flows and gamma heating in the places reserved for the experiments. This was essentially a complete qualification of the method of calculation used.

In the first phase, the program consisted of:

a. Making a subcritical approach by gradual fueling of the core, and determining the minimal critical size, then the available reactivity of the core which was to be operational in Osiris;

b. Measuring the efficiency of each of the six control rods;

c. Determining the distribution of power inside each of the fuel elements of the core in order to know, in every situation, the maximum power to be removed by a water duct.

To do this, the Isis core was identical to the first Osiris core. The flow measurements in the experimental sites which were not essential for the safety study of the core and for the compilation of the corresponding records were done in a later phase.

These measurements enabled us to verify some major parameters for irradiations: the fast and thermal neutron flows, and gamma heating.

(1) Flux thermique maximum 10^{14} n/cm^2/s	(2) Cœur U-Al cycle D 62	(3) Cœur oxyde	
		(4) Premier cycle	(5) Deuxième cycle
Moyenne des 6 (resp. 4) emplacements centraux (6)		Δ %	Δ %
	2,24	1,46 — 35 %	1,33 — 41 %
Moyenne des emplacements (9) face Nord (7)	2,42	1,86 — 23 %	1,81 — 25 %
Moyenne des emplacements (10) face Ouest (8)	1,73	1,64 — 5 %	1,53 — 12 %
Moyenne des emplacements (10) face Est (9)	1,36	1,55 + 14 %	1,55 + 14 %

Table 4: Results of Experimental Core Study

Key:

1. Maximum thermal flow
2. U-Al core: cycle D 62
3. Oxide core
4. First cycle
5. Second cycle
6. Average of six central locations
7. Average of locations on north side
8. Average of locations on western side
9. Average of locations on eastern side

These measurements confirmed the calculations, and gave us a precise estimate of the changes to be expected under test conditions. These data have also been confirmed by the experience acquired during the operation of Osiris.

A summary of the results is given in Table 4 (above).

Rapid Neutron Flow (E > 1 MVe)

The calculations had shown that the rapid flow was affected in an inverse ratio to the size of the core. This result was verified with Isis and with Osiris. In fact, we found that the average loss in rapid flow was a factor strictly and inversely proportional to the increase in the core size, when the number of elements was raised from 39 to 44, for hydraulic reasons peculiar to Osiris.

Thermal Neutron Flow

The very significant absorption of the new Caramel fuel, caused by its high uranium content, is expressed, for the same power, by a significant decline in thermal flow in the system ($\sim$40 percent for these experiments). However, the spectrum quality is better (approximately 40 percent gain in the rapid flow/thermal flow ratio).

The decline in thermal flow in the core has no unfavorable consequences for the experimental program, as the system is used solely for its rapid flow characteristics.

The thermal flow on the periphery is reduced on the average by 8 percent, but here we must also bear in mind the increase in the core size and the number of sites that can be used on the external grids.

γ Heating

γ heating decreases in the system, and this is an advantage for the experiments:

a. U-Al core	10 to 15 W/g
b. Caramel core	4 to 8 W/g

2.3.2. Thermo-Hydraulic Study

The measurements were designed to:

a. Determine the loss of load of the fuel element, bearing in mind the surface irregularities of the plate, caused by the special Caramel technology. This study was handled by the Reactor Service at Saclay, using the existing hydraulic loop for the tests of Osiris elements and irradiations;

b. And to ascertain the absence of vibrations in the standard fuel element and in the control element.

These measurements were made along with the determination of the loss of load in order to verify the lifting force of the elements and of the control rods (resulting from the upward circulation of the primary fluid in the reactor core).

A second series of tests conducted at Grenoble by the Department of Energy Transfer and Conversion concentrated on a thermal study of the duct. The results were analyzed jointly by the Department of Energy Transfer and Conversion and by the Reactor Study and Applied Mathematics Service.

All the results have shown that the Caramel element behaved much like the old U-Al element. The loss of load caused by friction is increased by about 5 percent but, considering this increase in the friction coefficient, the thermal behavior of the duct is slightly modified by the Caramel structure. The test results were analyzed under the code name of FLICA.

2.3.3. Safety Records

Because of the importance of the modifications, a detailed examination of their implications in terms of safety was conducted. In the very first phase, before the work, a complement to the Safety Report was issued and, after the fueling, a complete reedition of the Safety Report was released which covered, in addition to this safety study and the modifications made, the results of the start of service tests.

This reexamination of safety covered all the documents. However, the major studies and the most important modifications concerned the following areas:

a. Core physics: loading of the fuel, configuration, efficiency of the rods, power distribution, replacement of the fuel;

b. Primary cooling circuit of the core: new configuration of the circuit, pumps, exchangers, flows, loss of load, vibrations;

c. Thermohydraulics of the core at its permanent operational status, in transitional phases, and in natural convection;

d. monitoring of the first barrier: new DRG system; filtration circuit; automatic insulation of purification system;

e. Study of accidents and their radiological consequences on the environment.

III Behavior of the Fuel: Consequences for Operation

3.1. Record of Operation

The Osiris reactor was loaded with Caramel fuel in October 1979. The power increase test cycle took place in January/February 1980. Since then, and until July 1981, in addition to this test cycle, there have been 12 cycles of about 4 weeks each, operating at 70 MW, for a total of 21,600 MWj (see Table 5).

Cycles	Charge en uranium 235 en début de cycle (1) (g)	Energie fournie (2) (MWj)	Durée du cycle (3) en JEPP 70 MW	Irradiation moyenne des éléments sortis (4) (MWj/t U)
E 0	20 733	1 542	22	4 970
E 1	20 938	1 546	22,1	9 460
E 2	21 586	1 813	25,9	16 460
E 3	21 397	1 864	26,6	18 670
E 4	21 164	1 670	23,9	20 090
E 5	21 555	1 622	23,2	22 230
E 6	21 817	1 650	23,6	24 370
E 7	21 875	1 666	23,8	23 850
F 1	21 482	1 732	24,7	24 300
F 2	21 027	1 774	25,3	24 860
F 3	21 408	1 938	27,7	24 960
F 4	20 908	1 860	26,6	28 360
F 5	20 480	994	13,7	27 455

Table 5: Osiris Reactor: Cycle Characteristics.

Key:

1. Content of uranium 235 at start of cycle (g)
2. Energy supplied (MWj)
3. Duration of cycle in JEPP 70 MW
4. Average irradiation of elements removed (MWj/t U)

For each of these cycles, Table 5 gives the uranium 235 content at the start of the cycle, the energy supplied, the duration of the cycle, and the average irradiation of the elements removed. For the first core, the average enrichment had intentionally been reduced to about 6 percent, with fuels enriched to 4.75 percent, 5.62 percent, and 7 percent. The fuel now used is enriched to 7 percent. Towards the end of 1982, this enrichment will be increased to 7.5 percent.

Each element remains in the core for five to six cycles. During each cycle, there is a partial replacement of the fuel and a rearrangement of the remaining elements.

3.2. Conditions of Operation of the Fuel and Statistical Record

The conditions for the use of the fuel are quite stringent. In particular, the average and maximum specific powers are well beyond the values found for pressurized water reactors or for those possible for almost all the research reactors existing anywhere in the world:

a. Average specific power: 1,640 W/cm^3 of UO_2

b. Maximum specific power: 4,300 W/cm^3 of UO_2

In order to be certain of the good behavior of the fuel in the reactor, a program of systematic nondestructive examinations was undertaken. This entails monitoring the water ducts; this is done by a stress gauge and a comparison with the measurements made after manufacture. It covers all the assemblies unloaded after the first six cycles of operation and half of the assemblies removed after the next six cycles; this amounts to about 90 assemblies.

This program, which is now underway, will be completed by destructive examinations of one of the most heavily irradiated elements, having reached a mass combustion of 30,000 MWj/t U.

All the measurements done will help us to make an overall evaluation, statistically representative of the evolution of the characteristics and of the behavior of the Caramel Osiris fuel element under irradiation.

Since the start of service in Osiris, the average irradiation authorized has risen from 20,000 MWj/t U, the value designated as the first objective, to 25,000 MWj/t U in November 1980, and to 30,000 MWj/t U in February 1981. These authorizations are based on the good behavior of the fuel, the systematic nondestructive examinations made of the irradiated elements removed from the reactor, and destructive examinations of some elements. For the moment, the average irradiation level of 30,000 MWj/t U has not been reached in all of the elements removed. This level will be reached when the replacement elements are enriched to a level of 7.5 percent.

At present, 63 elements have exceeded 20,000 MWj/t U; of these, 26 are over 25,000 MWj/t U, and eight have reached an average irradiation level between 28,000 and 30,000 MWj/t U.

We should add that, for a fuel element whose average irradiation is close to 30,000 MWj/t U, the maximum irradiation is between 40,000 to 43,000 MWj/t U.

3.3. Behavior of the Fuel

The behavior of the fuel has been good and no major incident has caused any serious problems with contamination of the circuits. The only noteworthy incidents seem caused by problems arising from the manufacturing process used for the Caramel in this configuration and for the reactor's conditions of use.

During the power increase test cycle, three elements had to be removed even before the nominal power level was reached, because of abnormal rates in the DRG. Later, this sort of incident did not recur. An examination of one of the elements in hot cells at the Irradiated Fuels Research Laboratory at Saclay showed that this was caused by an initial manufacturing defect. After the first series of approximately 100 elements, the plate controls were improved and the satisfactory behavior of the fuel made it possible to increase the irradiation levels, as we indicated earlier.

Some bursts of γ-activity in the DRG at the end of 1980 and in early 1981, which did not release iodes or disrupt the delayed neutron signal, were probably a sign of micro-leaks in some of the Caramel elements. Systematic examinations should enable us to determine the origin, either a shield defect or swelling.

3.4. Consequences for operation

As the few initial incidents mentioned above never caused any real circuit contamination problems, there have been no severe radiological consequences affecting the personnel. On the contrary, the individual dosimeter readings show a general decline in the doses received by the pperating personnel, in relation to the period when the highly enriched U-Al fuel was used. This is caused essentially by the replacement of the aluminum shield by a zircaloy shield, which has meant a very large decline in the ^{24}Na activity of the water in the primary circuits and capacitors.

The performance losses in neutron flows found in irradiations confirm the experimental studies on Isis and the preliminary calculations. The consequences are quite limited for the testing program. The reduction of the fast neutron flow by about 9 percent has no disadvantage other than lengthening the duration of irradiations. The notable loss in thermal neutron flow inside the core causes no problems, as the corresponding sites are used for rapid flow irradiations. Externally, the average 8 percent loss in thermal neutron flow is compensated by the adjusted position of the irradiations and the increase in the number of high-flow sites.

IV Conclusion

This demonstration of the use of a slightly enriched fuel in a high-performance research reactor is a technical experiment of interest from all points of view.

Generally speaking, it seems that a research reactor, even one with performances as high as those of Osiris, does not necessarily need a highly enriched fuel. Of course, this reduction in enrichment is accompanied by a certain modification in the characteristics of the core in terms of the neutron flows. These modifications have not significantly hindered most of the irradiations.

In the particular case of the oxide plate fuel, known as Caramel, its behavior is quite satisfactory. The few defects found have been minor and the reactor can be used with a completely normal regularity. The change, from a radiological point of view, has been of benefit for the personnel.

This demonstration experiment successfully conducted with Osiris gives France an alternative solution for the highly enriched fuel used in its multipurpose research reactors. It strengthens France's position for exporting research reactors, as international trade in highly enriched uranium may in the future be tightly restricted.

It is certain that, for most of the existing reactors and announced projects, the irradiation conditions for this fuel would be much less stringent than those that have been tested at Saclay for almost 2 years.

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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 142

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WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 142

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CANADA'S SUPPLY OF NUCLEAR FUEL TO ARGENTINA TO CONTINUE

PY242215 Buenos Aires LATIN in Spanish 1403 GMT 24 Apr 82

[Text] Ottawa, 24 Apr (LATIN-REUTER) -- Prime Minister Pierre Trudeau today rejected a petition for Canada to suspend shipments of nuclear fuel for the reactor that it is building in Argentina and to withdraw Canadian technicians.

Canadian trade sanctions against Argentina--imposed after the Buenos Aires government occupied the Falkland Islands on 2 April--apply only to imports, Trudeau told members of Parliament who had told Trudeau that Argentina would use the reactor to fabricate nuclear arms.

Ian Waddell of the New Democratic Party demanded that the government suspend shipments of nuclear fuel worth $4 million which, according to Waddell, were being sent to Buenos Aires. Trudeau replied that Argentina had been comitted to adopting special safeguards when it signed the contract for the Candu heavy water reactor which is being finished near Buenos Aires.

Press reports had said that a cabinet document had expressed more serious concern than that expressed publicly by ministers over the possibility that Argentina might use the reactor in order to make atomic weapons.

CSO: 5100/2153

CLAIMS OF ARGENTINE, FRG NUCLEAR INVOLVEMENT REJECTED

NC291309 Paris AFP in English 1241 GMT 29 Apr 82

[Text] Brussels, 29 Apr (AFP) -- The vice-president of the Commission of European Communities here today rejected claims that West Germany and Argentina were collaborating to produce nuclear weapons in Argentina.

The Argentina-West German deal does not violate the principle of peaceful use of nuclear power, CEC number two Etienne Davignon said, reacting to a British Broadcasting Corporation report.

He denied that fissionable materials had been misappropriated on West German territory, and said the International Atomic Energy Agency (IAEA) in Vienna recently said there were no incidents of misappropriation of nuclear power producing materials in Argentina either.

"Both countries abide by the clauses (of their agreement) pertaining to the peaceful use of nuclear materials and submit to the on-the-spot controls required by the EURATOM Treaty, the London Suppliers Group and the IAEA," he said.

CSO: 5100/2153

ACTU HARDENS ANTI-URANIUM STAND, OPPOSES ROXBY ACTION

Canberra THE WEEKEND AUSTRALIAN in English 13-14 Mar 82 p 1

[Article by Ted Knez]

[Text]

THE ACTU yesterday warned that trade unionists would block the nation's largest on-shore resources project at Roxby Downs in South Australia.

The move is a major blow to the South Australian Liberal Government which already faces the risk of losing the $1000 million venture because of a State political impasse.

Construction is due to start next year on the massive-uranium-copper-gold prospect, with completion in 1985.

Hardening of the ACTU's previously softening position on uranium comes at a time when moves are under way in the Federal ALP to modify the party's anti-uranium policy.

Senior federal ALP officials said yesterday they were reviewing the policy of revoking nuclear export contracts if a Labor government came to power.

The future of the massive mining project was further thrown into doubt when the South Australian Labor Party yesterday reiterated its hard-line policy against the mining of uranium.

After an executive meeting in Melbourne yesterday, the president of the ACTU, Mr Cliff Dolan, said Roxby Downs was covered by the ACTU's anti-uranium policy.

"We will certainly be attempting to see that development does not take place," he said.

Mr Dolan rejected arguments that uranium mines were major employers — a case strongly put by the South Australian Government for the development of Roxby Downs.

The governing Liberal Party in South Australia has intensified its campaign over the past few days to save the already endangered Roxby Downs project.

A vital indenture bill, providing for a feasibility study and a start on construction, has been stalled by the opposition parties in State Parliament.

The Leader of the State Labor Opposition, Mr Bannon, indicated yesterday the bill would be opposed unless it was amended.

The Australian Democrats hold the balance of power in the South Australian Legislative Council and have joined forces with the ALP in opposing the bill.

But the South Australian Labor Party's position is certain to influence moves at the Federal level and future ALP policy on uranium mining.

LITMUS

The indenture bill vote is regarded in federal ALP circles as a type of litmus test of rank and file and union feeling on a change to Labor's uranium policy.

Mr Bannon agreed yesterday that the State ALP's policy "precluded" uranium mining at Roxby Downs under a State Labor Government.

The Opposition spokesman for Minerals and Energy, Mr Keating, said last night the Federal ALP's stand was in line with that of the party in South Australia.

The ALP's uranium policy was that no export could be allowed until the problems associated with the nuclear fuel cycle — particularly the disposal of radioactive waste and nuclear non-proliferation — had been solved to the satisfaction of a Labor cabinet.

Mr Keating said there had not been much progress on these issues and the ALP saw no reason to change its policy.

The attitude of organised labor was another matter.

Mr Keating said the ACTU had also decided not to allow the construction and operation of the Ranger mine in the Northern Territory to go ahead.

CSO: 5100/7523

DACCA TO HAVE FIRST RESEARCH REACTOR BY MID-1983

Dacca THE BANGLADESH OBSERVER in English 2 Apr 82 p 8

[Text] The country's first research reactor will be commissioned in mid-1983. The construction work to house the US origin three megawatt reactor is now going on at the Savar complex of Bangladesh Atomic Energy Commission.

Dr. Herman Vera Ruiz, an expert from International Atomic Energy Agency (IAEA) on radioisotope visited the construction site to assess the technological capability and the technical assistance needed in this regard. During his three day stay in the capital he had four technical sessions with the senior officials of Bangladesh Atomic Energy Commission (BAEC). He also had discussion with the BAEC Chairman Dr. Anwar Dossain on production of radioisotope. BAEC has taken up a scheme to produce radioisotope.

BSS adds: Dr. Herman Vera Ruiz, an expert of the International Atomic Energy Agency (IAEA) left Dacca on Wednesday for Vienna after three days of discussions with the officials of Bangladesh Atomic Energy Commission (BAEC).

According to a BAEC Press release, Dr. Ruiz held talks with Dr. Anwar Hossain, Chairman of the Commission and other scientists in connection with providing IAEA technical assistance for production of radio-isotope by the Bangladesh Atomic Energy Commission which has taken up a scheme to produ-ce Radio-isotope locally.

Dr Vera Ruiz who is working in the industrial application and chemistry section under the Division of Research and Laboratories of IAEA, Vienna also visited the Savar complex and Institute of nuclear medicine at the P.G. Hospital.

Radio-isotope has a long range of use in medical diagnosis, in industry for easy detection of complicated faults and in agriculture for developing High Yielding Varieties of crops. It has also use in other fields of research utilizing the 3 megawatt triga mark II research reactor recently procured from the United States and is under construction at Savar near Dacca, the Press release added.

CSO: 5100/7075

BRIEFS

NUCLEAR COMPLEX EXPLOSION--Bombay, March 31: The department of atomic energy today termed the explosion at the Nuclear Fuel Complex, Hyderabad, last week as a "minor incident." According to a spokesman, production at the complex will not be affected. The accident occurred in the reduction furnace where Zirconium Chloride is reduced with magnesium chloride. During regular operation of the plant, some defect was noticed in the pressure system and the plant was shut down. Following this, the furnace lid blew off, causing damage to the asbestos sheets and some glass panes, it was stated. There were no casualties, according to the spokesman. [Text] [Bombay THE TIMES OF INDIA in English 1 Apr 82 p 4]

CSO: 5100/7074

FOREIGN MINISTER SAYS PAKISTAN CANNOT BECOME NUCLEAR WAR THEATER

Karachi DAWN in English 7 Apr 82 pp 1, 6

[Text] **ISLAMABAD, April 6: The Foreign Minister, Sahabzada Yaqub Khan, today said there was no ground for alarm that Pakistan could become the theatre for any confrontation between the superpowers.**

He was speaking in the Majlis-i-Shoora on an adjournment motion, seeking to discuss a quoted statement of American experts on behalf of the US President in Congress wherein it was said that a future atomic war will be fought in countries like Pakistan and Afghanistan instead of Europe. The motion was moved by Mr Zahoorul Hasan Bhopali.

Pointing out that the motion was based on a speculative newspaper report, Sahabzada Yaqub Khan said Pakistan was following a policy of genuine non-alignment and had steadfastly worked for the reduction of tension, both in this region and elsewhere.

Pakistan, he said, had consistently worked for a peaceful settlement of the Afghanistan crisis. It had also taken the initiative to start a dialogue with India for the conclusion of a non-aggression pact. Its efforts to bring about peace between Iran and Iraq were recognised everywhere.

In the case of the Persian Gulf, which was mentioned in the news story mentioned by Mr Bhopali in his adjournment motion, the Foreign Minist[illegible] Pakistan had always tak[illegible] stand that the security of t[illegible] Gulf was the concern of the littoral States themselves.

On the larger Middle East question Pakistan had tirelessly worked with its Arab brothers for a just and honourable solution so that a major threat to world peace and security was removed. There was, therefore, no ground for such alarm, he added.

Sahbzada Yaqub Khan pointed out that the United States budget, announced in February 1982, showed an increase in defence spending. In his budget speech, the US President outlined the reasons why the defence expenditure was going up, emphasising that the increase was there to correct certain deficiencies in the US defensive capability.

The United States, he added, was a super-Power with interests in many parts of the world. It was not for Pakistan to assess its defence requirements, however, no part of the budget presentation by President Reagan could be construed to form the basis of the report referred to in the adjournment motion, he stressed.

The news report mentioned in the motion, Sahabzada Yaqub said, ascribed the view to some unnamed American experts that a future nuclear war would be waged in countries like Pakistan. This was fanciful and far-fetched, the added.

He said Pakistan was a non-aligned country, enjoying good relations with nearly all the major Powers, including the United States and the Soviet Union. There was no reason why it should figure in any confrontation between the super-Power, he added.

Pakistan, Shabzada Yaqub said, had always been in the forefront of the efforts to prevent the spread of nuclear weapons and eliminate all possibilities of a nuclear holocaust. Its proposal to create a nuclear-weapon-free zone in South Asia and its consistent support to the proposal for denuclearisation of the Indian Ocean and its littoral countries reflected this policy. Furthermore, Pakistan had been the prime mover of the UN call for security assurances to non-nuclear weapon states against the use or threat of use of nuclear weapons by nuclear powers.

However, the Foreign Minister said, if, despite all the international efforts, a nuclear war did break out, it would be meaningless to talk in terms of specific areas. In such a war, he added, the very suvival of mankind would be at stake.

After the Minister's statement, Mr Bhopali did not press the motion.

CSO: 5100/5646

BRIEFS

CHASHMA NUCLEAR PROJECT APPROVED--The ECNEC approved Chashma nuclear power project envisaging installation of 937 mw nuclear generation capacity plant at Chashma. The decision to resort to nuclear power generation has been necessitated by acute shortage of power in the country during winter due to low flows of river waters and resultant decline in hydel potential. As the oil-based generation has become very expensive due to ascending prices of fuel, and surplus gas is not available for commitment to operate a unit of 500 mw capacity plant, the only cheaper alternative available for Pakistan is to go for nuclear power generation. The project, which is stipulated to reach completion by mid-1988, will involve a total investment cost of Rs 16,818.00 million, including foreign exchange component of Rs 9,965.00 million. [Excerpt] [Karachi BUSINESS RECORDER in English 14 Apr 82 p 1]

CHASHMA CAPACITY INCREASE PLANNED--On 13 April 1982 Pakistan announced that it intends to increase the production capacity of the Chashma nuclear power center, presently under construction, which is located about 250 kilometers southwest of Islamabad. This production capacity which was originally to be 600 megawatts will be increased to 937 megawatts according to the same source which also added that the project, which will cost more than 1.6 billion dollars will be completed in 1988. [Text] [Paris LE MONDE in French 17 Apr 82 p 6]

CSO: 5100/5648

GOVERNMENT TO ESTABLISH NUCLEAR FUEL COMPANY

SK290211 Seoul THE KOREA TIMES in English 29 Apr 82 p 7

[Text] A nuclear fuel company will be established next month under a government program to fabricate nuclear fuel in the late 1980's, the Energy Resources Ministry said yesterday. According to the ministry, the planned nuclear fuel fabrication plant with a rated capacity of 200 tons of uranium will be established by the end of 1988. A total of 53.1 billion won at 1981 constant prices will be invested in the fabrication project, which will be set up in a joint venture between local and foreign companies.

The Korea Electric Power Corporation (KEPCO) and the Korea Advanced Energy Research Institute (KAERI) will form the nuclear fuel company next month. The ministry said a foreign partner in the local fuel fabrication project would be selected by the end of next month. The tie-up company will be owned 51 percent by KEPCO and KAERI and the remaining 49 percent by the foreign company.

If locally produced, the ministry said, the projected 200 tons of uranium would fuel 10 pressurized water reactors a year. The ministry pointed out that the fabrication project would enable the nation to provide nuclear fuel enough to meet the nation's needs from 1989. At present, the nation's first nuclear power plant, with a capacity of 587 megawatts, is in operation and eight other plants are under construction. The fabrication project is part of the government plan to reduce the heavy dependence on oil and to fabricate nuclear fuel locally to meet the ever-increasing demand. From a long-term viewpoint, the ministry said, the project will have considerable effect of saving foreign reserves. According to the timeschedule for the project, design of the fabrication plant will be completed by the end of 1985 and the plant building will be erected in June, 1987.

CSO: 5100/2153

SUN SAYS TAIWAN NEEDS NUCLEAR POWER STATIONS

OW190911 Taipei International Service in English 0100 GMT 19 Apr 82

[Text] The most widely circulated French-language weekly news magazine, LE POINT, or THE POINT, has quoted Premier Sun Yun-hsuan of the Republic of China as saying that the Republic of China is in need of a good-enough nuclear power station in every 2 years and there are many good opportunities for France to build the next one in the near future as a result of strengthening of substantial relations between France and the Republic of China through scientific and technical cooperation.

The French weekly news magazine contributed a two-page exclusive interview-story with Premier Sun by its special envoy (George Defferre), senior adviser and one of the founders of LE POINT, who is the first French journalist to interview Premier Sun in Taipei in 1982. Premier Sun told more than half a million French readers of LE POINT that the Republic of China in Taiwan serves as a lighthouse and hope of millions of people in mainland China who are under the yoke of Chinese communists and who know our condition of living. The full text of the exclusive interview granted by Premier Sun to (Defferre) is as follows:

Question: You are almost isolated diplomatically. Why don't you declare yourself as independent?

Premier Sun answered: By remaining China, we are the hope of millions of people in mainland China who know our condition of living, and we will not let Overseas Chinese who support the [words indistinct] cause of Taiwan to be disappointed.

Another question is whether the Peiping regime is changing?

Premier Sun answered: Indeed, it authorizes small private property and is willing to promote exchanges. But the rigidity of communism will block up the application of those reforms.

Why France didn't obtain the contract of your fourth nuclear power station, (Defferre) continued to ask.

Premier Sun answered: Your country was in a good position, and your technology is one of the best in the world. But Americans proposed a long-term credit, and that was more favorable. And (?could) electric power consumption would be doubled within 10 years. [sentence as heard] We will be in need of a new nuclear power station in every 2 years. There are many good opportunities for your country to build the next one. We have decided to establish durable relations with you.

And how is the plan of the underground subway in Taipei?

Answer: You are also in a good position in that aspect. In addition to France, there are Americans and Japanese who will soon ask for offers.

(Defferre), the journalist from the French newspaper, also asked: Why do you want to manufacture automobiles?

Premier Sun answered: Because we will be competitive. For the time being, a contract with the Renault. [sentence as heard] Thirty percent of spare parts will be imported from France, and we will produce the rest of it. Afterwards, we will sign a contract either with Toyota or Nissan. Forty percent of the capital will be Japanese and 60 percent will be ours. Do you think the Japanese will put so much money to the game if they don't believe in our success? The robot didn't scare us away because we don't have enough of manpower.

Do you still believe in an attack from Communist China, was the question.

And the answer: Actually it is not likely for the time being. Peking [as heard] is keeping its troops on the Russian and Vietnamese frontiers, and then they are short of landing material. However, the international situation is changing. For the purpose of defending ourselves, we need only aircraft and ships. The sea will take care of the rest. At present, we have American weapons. However, there are other manufacturers.

The French mass-circulation weekly news magazine also carried a blow-up, black-and-white picture showing (Defferre) as taking notes while interviewing Premier Sun in Taipei.

CSO: 5100/2153

'AFP': TAIWAN NUCLEAR FUEL PELLET TECHNOLOGY

OW221307 Hong Kong AFP in English 1258 GMT 22 Apr 82

[Text] Taipei, 22 Apr (AFP) — Taiwan's research center has successfully developed new technology for making nuclear fuel pellets of uranium dioxide, it was learned here today.

A research center report said the development provides a reference for process design in the manufacture of nuclear fuel at a future pilot plant in Taiwan. The research center has been studying the up-to-date technology for making nuclear fuel from uranium dioxide (UO2) in order to strengthen the self-reliance of Taiwan's nuclear industry.

The report said the newly developed manufacturing process of uranium dioxide from ammonium uranium carbonate (AUC) was better than the conventional one because it was simpler.

The report said that the powdered uranium dioxide manufactured from ammonium uranium carbonate had excellent fluidity and could be directly compressed into fuel pellets without going through the process of pre-pressure and other treatment. The consumption of the pellets was 92 to 98 percent, in accordance with international specifications, the report added.

The report said that the up-to-date technology of manufacturing uranium dioxide from ammonium uranium carbonate had been classified confidential by the advanced [word indistinct] countries.

CSO: 5100/2153

CEMA REACHES NUCLEAR GENERATING AGREEMENT

LD190958 Moscow TASS International Service in Russian 2208 GMT 18 Apr 82

[Summary] Moscow, 19 Apr (TASS) -- The latest session of the intergovernmental commission on the coordination of cooperation between CEMA member countries was recently held in Berlin. Participants from Bulgaria, Hungary, the GDR, Poland, Romania, the USSR, the CSSR and Yugoslavia discussed multifaceted international specialization and cooperation in the production and mutual supply of equipment for atomic powerplants [AES], PRAVDA writes today.

CEMA member countries have taken a course aimed at intensifying the construction of atomic powerplants, and a major agreement has been concluded which envisages specialization and cooperation in the production of equipment for AES's.

The intergovernmental commission stated that cooperation in the production of equipment for AES's is developing and strengthening. In the present 5-year plan, the transition to production of equipment for AES's of a new generation, with reactor installations of the VVER-1,000 type, which have 1 million kw capacity, is being effected. One power set in such an AES is capable of generating in 1 year as much power as can be produced from burning 2 million tons of organic fuel.

The commission has drawn up specific measures directed toward the punctual provision of AES's under construction in the CEMA member countries with equipment which is of high quality, reliable and safe in operation.

CSO: 5100/2153

CASTRO MADERO UNDERSCORES SIGNIFICANCE OF NUCLEAR FUEL PLANT

Buenos Aires LA PRENSA in Spanish 10 Apr 82 p 8

[Article:"CNEA Has Opened a Nuclear Fuel Element Factory"]

[Text] At a ceremony at which the head of the National Atomic Energy Commission [CNEA], Vice Adm (ret) Dr Carlos Castro Madero, officiated, the Nuclear Fuel Element Factory, which will be run by the mixed company Conuar, Inc, was opened at the Ezeiza Atomic Center.

The function was attended by national, Armed Forces and security officials. In a message, Castro Madero stressed the importance of the plant which has been opened, the first of its kind in Latin America.

The factory will supply fuel to the Argentine nuclear powerplants, initially supplying those of Atucha I, Embalse and Atucha II, in a consecutive fashion, and later expanding its capacity to provide for the other three which are planned to go into operation before 1997.

The head of the CNEA stated in his message that, with the opening of this factory, a decisive step is being taken toward the mastery of the fuel cycle and toward national self-sufficiency in the nuclear field.

From Castro Madero

Castro Madero remarked: "This achievement, with national and international projections, means that Argentina has acquired an actual technological and industrial capacity in a field which, up until now, has been limited to the most developed nations of the world."

He explained: "The importing of any technological or industrial development or innovation causes, simultaneously with a positive effect on progress and prosperity, a potential risk of economic dependence, or of a kind of scientific and technical colonialism."

He noted: "The nuclear electrical field is one wherein this rule applies particularly. The special features of the world market, the limited number of supplying countries and the heavy political and special interest pressures which typify it necessarily require avoiding those detrimental effects."

He subsequently commented that, "Nuclear fuel is a decisive factor, and therefore a constant, reliable supply must be insured."

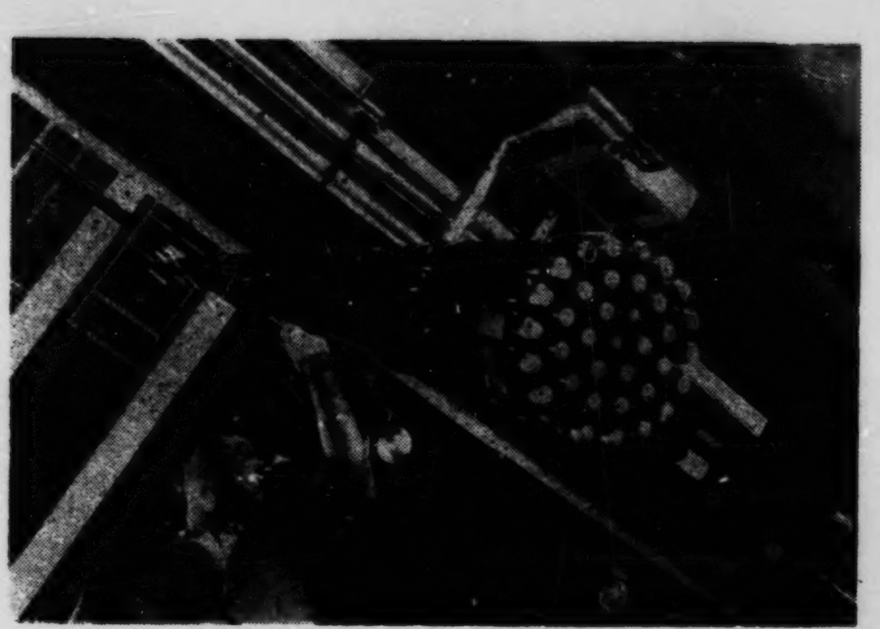
He added: "This stipulation necessitates the accomplishment in our country of all the phases for the production of nuclear fuel, from uranium exploration to the delivery of the fuel elements to the reactor."

He then emphasized that, in this context, the factory which has been opened "will make it possible to provide for a highly important phase in the mastery of the nuclear fuel cycle," by insuring a normal and economical supply of it for the country.

He later recalled that the pilot plant created in 1976 had produced 218 fuel elements, representing 86 percent of the core of Atucha I and over 50 percent of its annual consumption, with a quality level that is indistinguishable from that of imports.

He later stressed the fact that, in compliance with the principle of the subsidiary role of the state, a corporation had been set up for the factory with a majority participation by national private capital, on terms that guarantee the state's decision-making power.

Castro Madero asserted: "The type of action adopted makes it possible to guarantee that the country will have control of the nuclear fuel that it consumes, including its cost, and that it will also have the technological mastery, and hence the security of being able to continue bringing into the country improvements in design and new developments in the field of nuclear fuels."



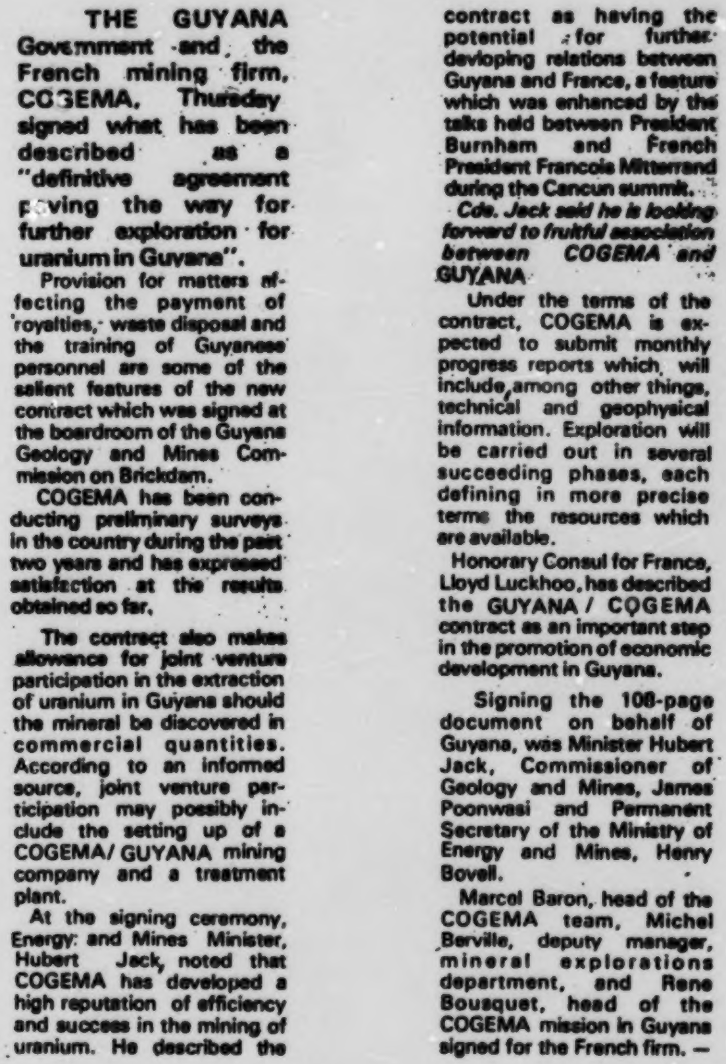
Final installation of a fuel element, consisting of 36 fuel bars and one for support. The zircaloy rods contain uranium in the form of dioxide cake.

2909
CSO: 5100/2149

URANIUM MINING AGREEMENT SIGNED WITH FRENCH COMPANY

Georgetown GUYANA CHRONICLE in English 20 Feb 82 p 20

[Text]



THE GUYANA Government and the French mining firm, COGEMA, Thursday signed what has been described as a "definitive agreement paving the way for further exploration for uranium in Guyana".

Provision for matters affecting the payment of royalties, waste disposal and the training of Guyanese personnel are some of the salient features of the new contract which was signed at the boardroom of the Guyana Geology and Mines Commission on Brickdam.

COGEMA has been conducting preliminary surveys in the country during the past two years and has expressed satisfaction at the results obtained so far.

The contract also makes allowance for joint venture participation in the extraction of uranium in Guyana should the mineral be discovered in commercial quantities. According to an informed source, joint venture participation may possibly include the setting up of a COGEMA/GUYANA mining company and a treatment plant.

At the signing ceremony, Energy and Mines Minister, Hubert Jack, noted that COGEMA has developed a high reputation of efficiency and success in the mining of uranium. He described the contract as having the potential for further devloping relations between Guyana and France, a feature which was enhanced by the talks held between President Burnham and French President Francois Mitterrand during the Cancun summit.

Cde. Jack said he is looking forward to fruitful association between COGEMA and GUYANA

Under the terms of the contract, COGEMA is expected to submit monthly progress reports which will include, among other things, technical and geophysical information. Exploration will be carried out in several succeeding phases, each defining in more precise terms the resources which are available.

Honorary Consul for France, Lloyd Luckhoo, has described the GUYANA / COGEMA contract as an important step in the promotion of economic development in Guyana.

Signing the 108-page document on behalf of Guyana, was Minister Hubert Jack, Commissioner of Geology and Mines, James Poonwasi and Permanent Secretary of the Ministry of Energy and Mines, Henry Bovell.

Marcel Baron, head of the COGEMA team, Michel Berville, deputy manager, mineral explorations department, and Rene Bousquet, head of the COGEMA mission in Guyana signed for the French firm. —

CSO: 5100/7522

GROUP PLANNING URANIUM MINE SABOTAGE ARRESTED

AB241335 Paris AFP in English 1217 GMT 24 Apr 82

[Text] Niamey, April 24 (AFP) -- Police in Niger have arrested 14 men of the Tuareg people, all but one of them from neighbouring Mali, who intended to sabotage the uranium mines at Arlit, a source close to the presidency said today.

On their arrest on April 9 and 10 the men said they were linked with Abdoulaye Diori, son of Niger's former President Hamani Diori, who was overthrown in 1974 by the armed forces and is still under house arrest.

The source said Abdoulaye Diori was involved in various smuggling rackets between France, Libya, Ivory Coast and Nigeria. He had also been seen in Chad.

The Tuareg group -- the 14th member was said to be from Niger while a 15th, also a Malian, had escaped arrest -- entered Niger unarmed, from an unspecified country, and there was no indication where they would obtain weapons or explosives.

The announcement of the arrests came a day after Niger President Seyni Kountche denounced the activities of "certain elements from the former RDA (African Democratic Rally) party", which was led from Niger's independence up to 1974 by Hamani Diori.

Arlit, situated 1,200 kilometres (750 miles) northeast of Niamey, has two large uranium mines.

CSO: 5100/2153

DAVYDOV BLAMES U.S. FOR NUCLEAR PROLIFERATION

PM231521 Moscow KRASNAYA ZVEZDA in Russian 20 Apr 82 p 3

[Candidate of Historical Sciences V. Davydov article: "The Fruits of Adventurism: Washington Is Helping to Proliferate Nuclear Weapons"]

[Text] The R. Reagan administration's course of whipping up the arms race, exacerbating international relations and suppressing the peoples' liberation struggle has led to a sharp increase in the threat of the further proliferation of nuclear weapons on our planet. The probability has now increased that a number of so-called "near-nuclear" states not party to the treaty on nuclear nonproliferation (1968), like Pakistan, Israel and South Africa, could embark on the path of an open nuclear arms race. The rulers of those states, in order to realize their nuclear ambitions, cunningly exploit Washington's interest in stepping up their contribution to American imperialism's global strategy.

The possibility of an uncontrolled expansion of the "nuclear club" is fraught with unpredictable, pernicious consequences for international security. It is not hard to imagine where the development of events could lead if the arsenals of such quarrelsome countries as, for instance, Israel were to include nuclear weapons too. An increase in the number of nuclear states would also cause extreme complications on nuclear disarmament questions, which require urgent resolution now more than ever before.

As of now 117 states have signed and ratified the nonproliferation treaty. But some 50 countries still have not accepted it, including nuclear powers — the PRC and France.

There are still forces in the world which seek to obtain nuclear weapons in order to threaten freedom-loving peoples. In this situation great significance is attached to the tasks of cutting short such attempts by reactionary regimes and implementing a consistent policy in the sphere of nonproliferation. Annual UN General Assembly resolutions call for this, and it is advocated by the Soviet Union, the fraternal socialist countries and most of the states of the world community.

What is Washington's approach to the resolution of these problems? It is declared at a high official level that the nonproliferation of nuclear weapons is "one of the main aims of U.S. national security and foreign policy." The extent to which these words correspond to practical actions can be seen from the American approach to relations with potential members of the "nuclear club."

Pakistan, for instance, sees the United States as the main champion of its hegemonist policy in South Asia. That is why the Reagan administration obtained from Congress the lifting of the "Symington-Glenn amendment" to the law on military aid, which banned arms deliveries to countries carrying out secret work in the nuclear sphere. It was decided to sell Islamabad, along with other military hardware and armaments, 40 F-16 fighter-bombers, which could be used as a means of delivery of nuclear wapons. Even in the United States this was seen as encouragement for the nuclear ambitions of Ziaul Haq's dictatorial regime. Senator A. Cranston noted, not with sarcasm: "If I were the leader of Pakistan I would take this step to mean that I can detonate a bomb and U.S. aid will continue."

Washington officials assert that conventional arms deliveries will slow down the rate of Pakistan's nuclear preparations. The fact that such preparations are in full swing there is no secret in the United States. The American administration recently sanctioned an information leak from a secret CIA report asserting that solely "thanks to American aid" Pakistan has postponed for 2 or 3 years the nuclear weapons test which it planned to conduct in late 1982. But it should be obvious that if Islamabad did adopt such a decision, it was dictated by its desire to obtain as much American military hardware as possible before openly declaring itself a new nuclear state.

The world press reports that Pakistan is continuing to stockpile nuclear technology and materials which could be used for military purposes.

Military deliveries to Ziaul Haq's regime and Washington's desire to interfere in the affairs of the countries of the Indian subcontinent have already led to an appreciable increase in tension in South Asia. Islamabad's nuclear ambitions cause legitimate concern in neighboring India, which has declared that it will be forced to adopt appropriate measures if Pakistan becomes a nuclear state. In this connection the American journal FOREIGN POLICY warns: "The United States is increasing the danger that military operations using conventional armaments in South Asia could lead to a nuclear conflict."

U.S. "stragetic cooperation" with another "near-nuclear" state -- Israel -- is producing luxuriant militarist blossoms. The chief U.S. ally in the Near East receives very large consignments of modern American armaments. In 1982 alone Washington has pledged to grant Israel military and economic aid to the tune of $2.5 billion. Yet even by CIA assessments Israel may have already created nuclear weapons and be now rapidly progressing toward the creation of delivery vehicles. It is the aim of the Israeli aggressors -- an aim which is fully in accordance with U.S. interests -- to dictate their capitulation terms to Arab countries "from a position of strength." Such diktat, Tel Aviv believes, would be irresistible if it were based not only on conventional but also on nuclear weapons.

The United States is also extending its military-political cooperation with racist South Africa, which Reagan has called a "friendly and allied" state. Washington sees South Africa as a candidate for the role of regional gendarme in the south of the African Continent and intends to obtain military bases on its territory, on the basis of which it plans to gain control of the southeastern Atlantic and the southwestern sector of the Indian Ocean.

Pretoria's rulers have their own plans. In offering their services to the United States and NATO they make no secret of their nuclear lusts. Thus L. Barnard, head of the South African intelligence service, has stated that they should develop nuclear weapons before it is too late, as "weapons of last resort" in the struggle against national liberation forces.

The facts show that in this extremely dangerous venture the racists are receiving support from across the ocean. According to a Washington POST report the American industrial companies (EDLOU) International and (SVUKO) have made available to the apartheid state more than 100 tons of enriched uranium, which is needed for the manufacture of the atom bomb. And according to the Johannesburg STAR the Reagan administration has given the American corporation Control Data permission to sell South Africa two computers which, as American Congressman William Gray warned, could be used to calculate the yields of nuclear charges and explosions.

Thanks to aid from Western countries the South African Army already has Canberra and Mirage planes capable of carrying nuclear bombs and missiles. According to Western press reports South Africa and Israel are carrying out work in an atmosphere of the utmost secrecy on creating nuclear submarines and cruise missiles.

In 1979 and 1980 mysterious flashes occured south of the South African coast. In the opinion of a number of foreign experts these could have been nuclear tests carried out by the South African racists. Let us recall that back in 1977 South Africa was about to test a nuclear bomb. At that time it was only thwarted because of a timely Soviet warning given in a TASS statement.

Not so long ago South Africa's racist bosses and Chile's fascist junta exchanged visits by high-ranking military delegations. In the course of the talks there was discussion of creating a South Africa-Chile axis, which U.S. ruling circles regard as one of the most important possible levers for the implementation of their South Atlantic strategy.

These contacts are particularly sinister in the light of South Africa's nuclear aspirations and of a report which appeared even earlier in Chile's EL MERCURIO newspaper on the possibilities which exist for creating an atom bomb in Chile.

The Reagan administration's course of strengthening the military potential of Pakistan, Israel, South Africa and other countries and extending military-political cooperation with them is becoming increasingly evident. This at least indicated a U.S. departure from the commitment to actively oppose the nuclear ambitions of countries preparing to challenge the policy of nonproliferation of nuclear weapons. Moreover, as foreign observers note, the impression is created that Washington is embarking on a risky "game" in the hope that the new nuclear states having allied or friendly relations with it could create an additional threat to the socialist and developing countries and thus make it easier for U.S. imperialism to achieve military advantages on a global scale. But such calculations are as adventurist as they are shortsighted, since sooner or later they will rebound on their originators.

As you see, Washington is verbally calling on others not to create nuclear weapons but in practice itself regards these weapons as the main means of implementing its hegemonist policy and actually connives at the nuclear ambitions of antipopular regimes which are to its liking. This hypocritical behavior cannot fail to significantly weaken the effectiveness of the nonproliferation treaty.

As Comrade L.I. Brezhnev has stressed, the spread of nuclear weapons from one country to another "will increase the danger of a nuclear conflict breaking out, even by accident. Then no 'nuclear umbrellas' will provide cover against the lethal storm." To put an end to American imperialism's nuclear adventurism — that is the peoples' resolute demand.

CSO: 5100/2153

MOSCOW VIEWS NUCLEAR NONPROLIFERATION ACTIVITY

'IZVESTIYA' on Treaty Potential

PM161047 Moscow IZVESTIYA in Russian 2 Apr 82 Morning Edition p 5

[Article by S. Tarov: "Dialogue, Not Confrontation"]

[Text] The foreign press and political and public figures in various countries of the world continue to devote great attention to the new constructive proposals advanced by L.I. Brezhnev, general secretary of the CPSU Central Committee and chairman of the USSR Supreme Soviet Presidium, at the 17th USSR Trade Union Congress and in his Tashkent speech. They are beginning to come to the conclusion that these proposals deserve responsible examination in North Atlantic bloc capitols, too. The growing antiwar movement has spread from Europe to the United States. The American public, politicians and congressmen are calling on the U.S. administration to heed the voice of realism and reason and to understand that it is a matter of curbing the arms race and averting the threat of world nuclear war.

The new proposals reflected the Soviet Union's consistent and principled course toward eliminating the danger of war. The problem of reinforcing the nonproliferation of nuclear weapons occupies an important place in the Soviet Union's multipronged struggle to avert the threat of nuclear war. An unprecedented arms race, colossal appropriations for military purposes, the aggravation of the international situation and the kindling of militarist hysteria -- these are the chief components of the current foreign policy of the United States and its closest military and political allies. This lends the problem of nonproliferation of nuclear weapons special acuteness and topicality.

According to the International Atomic Energy Agency (IAEA), the capacities of nuclear power stations will account for 26 percent of world energy capacity by the end of the current century, and finished production of plutonium will reach 1.5 million kg.

Yet a 20-kiloton atomic bomb capable of producing an explosion as in Hiroshima requires a mere 8 kg of plutonium. Imagine the real scale of the danger threatening the peoples of the planet.

The treaty on the nonproliferation of nuclear weapons, which came into force in 1970 and to which 118 states are now party, has proved to be a highly valuable document in international law serving the cause of protecting peace and barring the way to thermonuclear catastrophe. The states which have signed the treaty have not broken their pledges during this time. The pledge of all the parties to the treaty not to pass fissionable materials or equipment to a nonnuclear state, unless IAEA control is extended to them, has also been observed.

Thus, the treaty has effectively served the interests of all countries. Its conclusion was an important step on the path of curbing the nuclear arms race. It laid a solid foundation for the development of fruitful international cooperation in the cause of the peaceful use of nuclear energy.

In the present international situation, which has been complicated through the fault of the United States, both the desire of a number of countries to possess nuclear weapons and the intentions of certain developed Western countries to expand the transfer of nuclear equipment, materials and technology to other countries, are being manifested with increasing persistence. And this could become a channel for the proliferation of nuclear weapons. In these conditions there is an increase in the importance of measures aimed at preventing the transfer of nuclear equipment, materials and technology from resulting in the proliferation of nuclear weapons.

With the help of measures to monitor states' nuclear programs, the IAEA could determine that nuclear fuel is not being used for military purposes. Under conditions in which the treaty's opponents are trying to undermine nonproliferation, it is especially important to seek to expand the circle of parties to the treaty. Let us note that two nuclear states -- China and France -- and a whole range of "subnuclear" countries have still not become party to the treaty. An improvement in the system of IAEA guarantees, an increase in its effectiveness and tighter monitoring of nuclear exports should also be sought. These demands are highly urgent.

The Soviet Union is tirelessly seeking to increase the treaty's effectiveness, avert the dangerous saturation of nonnuclear states with nuclear weapons, ensure their security with the help of guarantees and also guard these countries themselves from the temptation to acquire such weapons. On the initiative of the USSR, not only was the treaty on nonproliferation adopted but every subsequent year there has also been wide discussion of the question of guarantees in the Security Council, at UN General Assembly sessions and in the Disarmament Committee. The USSR believes that to prevent the proliferation of nuclear weapons is one of the tasks of the second decade of disarmament.

The USSR's readiness to conclude a special agreement with any nonnuclear state was greeted with tremendous interest at the UN General Assembly special session on disarmament in 1978. The thrust of this agreement is that the Soviet Union will never use nuclear weapons against those states which do not produce and acquire these weapons and do not have them on their territory. In its concluding document the special session called on nuclear states to give assurances that they will not use nuclear weapons against nonnuclear states and will not threaten them with their use. Subsequently, on this basis, the USSR proposed the conclusion of an international convention on strengthening security guarantees for nonnuclear states. The adoption of this proposal could help considerably to reinforce the nonproliferation of nuclear weapons.

The task of reducing the threat of nuclear war is helped by the Soviet proposal for the nuclear powers to renounce the siting of nuclear combat systems and stockpiles of nuclear warheads, bombs, shells and mines in places where there are none.

In this instance it is a question of supplementing pledges formerly adopted by nuclear states to go to the aid of nonnuclear states in the event of a nuclear attack or threat of attack. It is proposed that new pledges be adopted: Not to use nuclear weapons against countries which do not have them.

The Soviet Union also wholly supports the desire of the nonnuclear states to protect their territories and peoples from involvement in nuclear conflict by creating nuclear-free zones. The USSR is party to Protocol II of the Treaty for the Prohibition of Nuclear weapons in Latin America (the Tlatelolco Treaty) and thereby assumed a commitment to observe the status of a nuclear-free zone on this continent. It is known that the Soviet Union supports ideas for creating nuclear-free zones in other regions, in particular former Finnish President U. Kekkonen's idea for the creation of a nuclear-free zone in northern Europe. The Soviet position on this question takes account of the fact that countries which preserve their nuclear-free status, that is, do not acquire and produce nuclear weapons and do not allow them to be deployed on their territory, are thereby reinforcing nonproliferation and making their own contribution to reducing the threat of the outbreak of nuclear war.

There is a growing understanding in the world of the urgent need to stop the nuclear arms race, and achieve nuclear disarmament. At the last UN General Assembly session on 9 December 1981 an overwhelming number of states voted for the UN General Assembly declaration, proposed by the Soviet Union, on averting nuclear catastrophe which declared the first use of nuclear weapons to be a very grave crime against mankind.

However, the United States and its closest military and political allies did not support this decision. They thereby demonstrated to the whole world their reluctance to take part in the process of averting the danger of nuclear death creeping over the globe.

In response to the growing nuclear threat the Soviet Union is working out ways to curb the escalation of tension and lower the level of military confrontation. "The Soviet Union," Comrade L.I. Brezhnev stressed in his letter to Japanese writers who authored an appeal against nuclear war, "is ready to liquidate its nuclear arsenal, but, of course, only if all other states with nuclear weapons also do so." This is not merely a demonstration of our good will, but a clear and considered position reflecting the socialist nature of our state and the peaceableness of its foreign policy.

'PRAVDA' Urges Measures

LD171107 Moscow TASS in English 1040 GMT 17 Apr 82

[Text] Moscow, 17 April, TASS -- It is necessary to prevent proliferation of nuclear weapons, the newspaper PRAVDA urges.

"The problem of nuclear non-proliferation is a component part of the global task of preservation of peace, consolidation of international security, restraining of the arms race. This task is particularly acute in conditions when the number of countries, having nuclear weapons increased, and broader became the circle of the so-called 'near-nuclear' states, which for thier scientific-technical and economic potential could produce nuclear weapons themselves."

In the 1970's PRAVDA recalls, a number of political and legal measures, both multilateral and national, were taken with a view of preventing nuclear proliferation. The whole complex of these measures and the international practice, which was established on their basis, they started calling "nuclear non-proliferation regime," which on the whole proved its vitality and efficiency. It undoubtedly helps maintain the stability of the present-day international relations, creating simultaneously a solid basis for broad development of international cooperation in the sphere of peaceful uses of atomic energy.

The foundation is the nuclear nonproliferation treaty, which was elaborated on the Soviet Union's initiative. The treaty entered into force in March 1970, and now 117 states are signatories to the treaty.

"One of the main tasks now is to broaden the circle of states, signatories to the nuclear non-proliferation treaty," PRAVDA stresses. About 50 countries, including two nuclear powers -- France and China -- have not yet joined the treaty. The cause of a particular anxiety is the fact that about a dozen of "near-nuclear," so-called "threshold" states, decline participation in the treaty. Among them are such states as Israel, the Republic of South Africa, Pakistan which do not conceal their nuclear ambitions. But Washington, heightening international tension and escalating the arms race, indeed renders political and military support to the pro-imperialist regimes, irrespective of their stand on questions of non-proliferation of nuclear weapons. This course actually leads to encouragement of nuclear ambitions of such countries as Israel, South Africa, Pakistan.

The United States lifted the ban on military aid to Pakistan, though, as is well known, work is under way in that country to develop an atomic bomb. Another example is Washington's support to Israel in connection with its bandit attack on the Iraqi nuclear research center, which is intended for peaceful purposes.

In the present-day conditions, PRAVDA believes, "it would be useful to put under control of the International Atomic Energy Organization all nuclear activities in countries, recipients of nuclear materials, equipment and technology and also to cover all exporting countries with agreed-upon measures of control."

The newspaper writes that "adoption of further efficient steps to prevent proliferation of nuclear weapons is one of the most important problems of international politics. As was repeatedly stated competently, the Soviet Union is ready to cooperate with other states in this solution."

CSO: 5100/2155

NUCLEAR AID TO ARGENTINA TO BE ADDRESSED

LD241330 Hamburg DPA in German 1144 GMT 24 Apr 82

[Text] Bonn, 24 Apr (DPA) -- The Federal Government will comment in the Bundestag on nuclear cooperation with Argentina and once again clearly reject the charges made in a British BBC television film that the Federal Republic assisted that country in developing a nuclear bomb. Questioned by DPA, a Research Ministry spokesman confirmed today in Bonn that this will be in a comprehensive government reply to parliamentary questions.

SPD Deputy Klaus Thuesing was the first to ask the Federal Government for information on what it has done so far to reject the statements in the controversial television film, and since then notice has been given of furtther questions from coalition deputies, and also from parliamentarians of the CDU/CSU opposition. It was reported that when this topic is dealt with in one of the Bundestag's next question hours -- possibly next week -- emphasis will be placed on the consensus of all Parliamentary Groups and the government that the Federal Republic's conscience is absolutely clear concerning cooperation with Argentina in the peaceful use of nuclear energy.

GoverNment Spokesman Lothar Ruehl, in connection with the screening of the television film, has already repeatedly rejected the claims made in it that Bonn at least indirectly aided development work on an Argentine nuclear bomb and as a result of inadequate surviellance contributed to Buenos Aires soon being able to sell plutonium for the manufacture of nuclear weapons to other states. He pointed out that in its safety requirements the Federal Government adheres strictly to the agreements of the International Atomic Energy Agency in Vienna.

CSO: 5100/2153

GOVERNMENT AGAIN DENIES NUCLEAR AID TO ARGENTINA

LD291534 Hamburg DPA in German 1329 GMT 29 Apr 82

[Text] Bonn, 29 Apr (DPA) — The Federal Government has again denied most emphatically the alleged German cooperation with Argentina in the construction of nuclear weapons. During question time in the Bundestag, Minister of State at the Foreign Ministry Peter Corterier (SPD) today gave the assurance, in connection with accusations to this effect on British television, that no enriched uranium had been supplied illegally from the Federal Republic to Argentina. Neither was there any cooperation in the construction of a reprocessing plant.

Commenting on information that Argentina was able, with the help of enriched uranium from the USSR and of German nuclear technology, to manufacture nuclear bombs within the country, Corterier said that Bonn had no knowledge indicating that such fears were justified. He pointed to a statement by the EEC Commission in Brussels which he said made it clear that the various agreements between the Federal Republic and Argentina in the field of nuclear cooperation were in full accord with the agreements on the peaceful use of nuclear energy.

CSO: 5100/2153

FRANCE

INDUSTRY MINISTER DISCUSSES FACTORIES FOR IRRADIATED FUEL TREATMENT

Paris REVUE GENERALE NUCLEAIRE in French Jan-Feb 82 p 61

[Article: "Scientific Commission on Management of Irradiated Fuels"]

[Text] Following is a letter from the minister of industry to the chairman of the Higher Board of Nuclear Safety:

"... Composed, as is evident from the contacts you have had with my colleagues, of leading figures in the scientific and technical fields, and presided by Mr Castaing, member of the Academy of Sciences, this working group is expected to provide the government with a clear and thorough insight into the current technical situation as regards reprocessing, its evolutionary outlook, the options to which we are presently committed, and our envisionable variants or alternative solutions.

"As you know, by government decisions, work is under way on the modernizarion and expansion of the La Hague establishment's UP2 plant, and work on the new UP3 A plant will start in April 1982. The group will examine the projects involved, particularly from the standpoint of the projected improvements in the operation of the establishment. In addition, as part of the study of envisionable alternatives to reprocessing, it will submit an analysis of the solutions currently being studied, abroad as well if applicable, accompanied by recommendaations as to any research or experimental programs it may deem appropriate to pursue, with other countries as well should this also be deemed advantageous. From a more general standpoint, the group will submit any recommendations designed to keep France in the forefront of the technological competence needed to ensure optimal management of irradiated fuels.

"This group may hear any person whose contribution it may consider desirable, and particularly, the officials of the CEA [Atomic Energy Commission] and the COGEMA [Nuclear Materials General Company]; it will establish regular contacts with the local elected officials concerned in regard to the reprocessing plants at La Hague and Marcoule, as well as with the labor organizations representing the personnel of these plants.

"I desire to be kept informed of the progress of this work and would highly value a report on all the problems associated with reprocessing, drawn up by this working group, then discussed within the Higher Board on Nuclear Safety, and forwarded to me within 1 year. Should a fundamental question arise such as would justify bringing it to the attention of the government or the Parliament, the group should notify me immediately through your office."

9238
CSO: 5100/2136

BUDGET, PERSONNEL OF REACTOR IN GRENOBLE DESCRIBED

Paris REVUE GENERALE NUCLEAIRE in French Jan-Feb 82 p 61

[Article: "The HFIR After 10 Years"]

[Text] The HFIR [high-flux isotope reactor] of the ILL [Laue Langevin Institute] at Grenoble has just celebrated its 10th birthday. It was on 16 December 1971 that it attained for the first time its nominal power of 57 MW. Its balance sheet at the conclusion of this 10-year period of operation results highly positive, and justifies the agreement signed recently in London prolonging the use of the reactor to 1992.

The institute was founded in 1967 jointly between France and the FRG; the United Kingdom joined these two countries in 1973. The members of the Institute are now the CNRS [National Center for Scientific Research], the AEC [Atomic Energy Commission] (France), the Kernforschungszentrum Karlsruhe (FRG), and the Science and Engineering Research Council (United Kingdom).

The ILL operates the only operational high flux reactor in Europe, furnishing neutrons from it for research in solid state physics, metallurgy, chemistry, biology, nuclear physics and elementary-particle physics. The Institute is primarily for the use of the member countries, but the scientists of any other country may come there to carry out experiments judged to be of an advanced nature. From the standpoint of its technical equipment, its instruments and its scientific methods, the ILL occupies a leading position in the scientific world.

Each year, the Institute welcomes some 1,700 researchers from some 150 different laboratories who come there to perform experiments using the HFIR, generally with the assistance of the personnel of the ILL. The 33 different available instruments make possible the simultaneous actualization of a large number of experiments. Between 1,000 and 1,200 proposals for experiments are submitted each year to the Scientific Board, which selects some 700-800 of them for actualization.

The staff of the Institute currently numbers 435 employees, some 100 of whom are scientists. Its 1981 budget totaled around 157 million francs. A modernization program, approved in 1979 and due to be completed in 1985, provides for a renewal of its scientific and technical installations.

In a forthcoming issue of REVUE GENERALE NUCLEAIRE, we will go into more detail on the characteristics and utilization of the ILL reactor.

9238
CSO: 5100/2136

NUCLEAR MATERIALS FIRM REVEALS URANIUM, RECYCLING ACTIVITIES

Paris REVUE GENERALE NUCLEAIRE in French Jan-Feb 82 pp 76-77

[Article: "Uranium Exploitation, Enrichment, Reprocessing: The Orientations of COGEMA"]

> [Text] In its November-December 1981 issue, COGEMAGAZINE--the COGEMA [General Nuclear Materials Company] house organ--publishes a substantial body of information on the development of COGEMA's activities. C. Gobert, manager of its Natural Uranium Division, J. F. Petit, president of EURODIF [European Diffusion Agency], and S. Aycoberry, manager of the Reprocessing Division, in a series of interviews, discuss in much detail the insertion of the enterprise's activities into the natural and socioeconomic local environment. Information is also given in comparable detail on the orientations of COGEMA in its three major domains of activity.

Uranium: The World's Leading Producer

Concerning the exploitation of uranium, COGEMAGAZINE notes that, taking into account all of COGEMA's holdings, COGEMA supplied in 1980 between 18 and 20 percent of world production (socialist bloc excluded), becoming thus the planet's leading producer. With respect to the company's mining activities in the metropole, C. Gobert indicates:

"We have two objectives: To protect to the greatest possible extent our mining activities in France from the current slump in the world uranium market, and to continue to prospect new regions for our crews and increase the proved mining potential in the regions we are now working.

"The first objective means that we must watch very closely our production costs and establish well-thought-out production programs. Need we be reminded that the international price index of uranium has dropped by about half its level in 2 years? This has compelled us to make major sacrifices to maintain our production programs at a high level.

"The second objective means that our exploitation programs in France, if they can be adjusted opportunely, will continue. The results obtained, for example, at Coutras--where more than 20,000 tons of uranium have been discovered--certainly encourage perseverance. The fact is that our national uranium is the best there is and we very much expect to go on discovering more of it."

EURODIF's Foreign Currency Earnings: 8 Billion Francs Annually

Pointing out that EURODIF's capacity (10.8 million UTS [separation work units]/yr) --which will very shortly be attained--will make it the world's second largest producer of uranium enrichment services, COGEMAGAZINE evaluates the foreign currency earnings attributable to the Tricastin plant. "Half of EURODIF's annual sales," it indicates, "will be exports under firm contracts. During its construction period as well as during its exploitation period, its contribution to the French balance of payments has already been positive. By mid-1980, the net foreign exchange revenues brought in by the project had already reached 7 billion francs. During the 1982-1990 exploitation period, its net foreign exchange earnings will be of the order of 8 billion francs annually.

"It is pointed out, moreover, that the initial planning as well as the initial budget have been strictly adhered to. The latter, in terms of current money, comes to about 15.5 billion francs, which, taking into account interim interest charges and start-up expenses, represents an investment of 23 billion current francs.

Recycling of Depleted Uraniums

Depleted uraniums that issue from the EURODIF plant as secondary products can be recycled in fast reactors. "For the very long term and as a function of the penetration of of fast reactors," COGEMAGAZINE points out, "these uraniums represent a sizable energetic potential." In this regard, COGEMAGAZINE cites the following information:

"The recycling of depleted uraniums makes available around 60 percent of the energy contained in these uraniums versus only 0.6 to 0.7 percent without recycling and 1 percent with recycling in thermal reactors such as a PWR [pressurized water reactor].

"The recycling of EURODIF rejects that can be done in fast reactors could produce 5.4 million kW-hrs/kg of depleted uranium, that is, 1.2 million tep [tons equivalent oil] per ton of uranium.

"Considering that EURODIF rejects total around 10,000 tons/yr of depleted uranium, that is, 300,000 tons over a period of 30 years, this represents a deposit of 360 gtep [giga-tons equivalent oil] that becomes available.

"This potential very-long-term resource represents three times the world's known oil reserves. This is why COGEMA, considering the legacy owed to future generations, has decided to build Plant W to convert EURODIF's depleted UF6 output into a stable product--U308--which can be stored without major problems pending its eventual use during the fast reactor cycle."

UP 2 800 and UP 3: Automation and Master/Slave Manipulation

With regard to the expansion of La Hague--which will provide COGEMA with a reprocessing capacity to the tonnage of irradiated fuels produced by the EDF [French Electric [Power] Company] as of the mid-1990's--COGEMAGAZINE comments specifically on technical context that will mark the actualization of UP 2 800 and UP 3:

"These two units will benefit from the experience acquired over 23 years of operation of the Marcoule plant and 15 years of operation of La Hague. The procedures and equipment to be put in place there will be the most recent, developed, fine-tuned and tested industrially by the specialized services of the AEC [Atomic Energy Commission].

"The very severe internal radiation-safety objectives that have entered into the design of these future plands requires an advanced degree of automation of all operations that could present a hazard in the form of irradiation or contamination of personnel, and the systematic adoption of master/slave manipulation equipment for the disassembly from a distance of the equipment installed in circuits carrying radioactive fluids.

"Lastly, these plants will be equipped with all the necessary installations for the on-line processing of all the waste they produce. Any ensuing liquid rejects will remain within the limits set by the decrees relative to the existing UP2 plant, which has only one-fourth the capacity. The desired result will be achieved through a special effluents-recycling feature of the processing and a substantial improvement in the performance characteristics of the effluents-processing station."

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CSO: 5100/2134

ACTIVITIES, LAYOUT OF LA MANCHE RADIOACTIVE WASTE FACILITY

Paris REVUE GENERALE NUCLEAIRE in French Jan-Feb 82 pp 78-79

[Excerpt] The ANDRA [National Agency for Managing Radioactive Waste] recently published an introductory brochure on the La Manche Facility for the storage of short-lived radioactive waste (low and moderate activity).

Situated at the tip of Cotentin, 25 km west of Cherbourg and in the immediate vicinity of the La Hague reprocessing plant, this facility occupies an area of 12 hectares. Waste is stored there in shallowly buried structures (monoliths) or in surface structures (tumuli) covered over with a waterproof clay topping, then with loam.

These wastes, the ANDRA brochure indicates, contain essentially short-lived radioelements (half life less than 30 years).

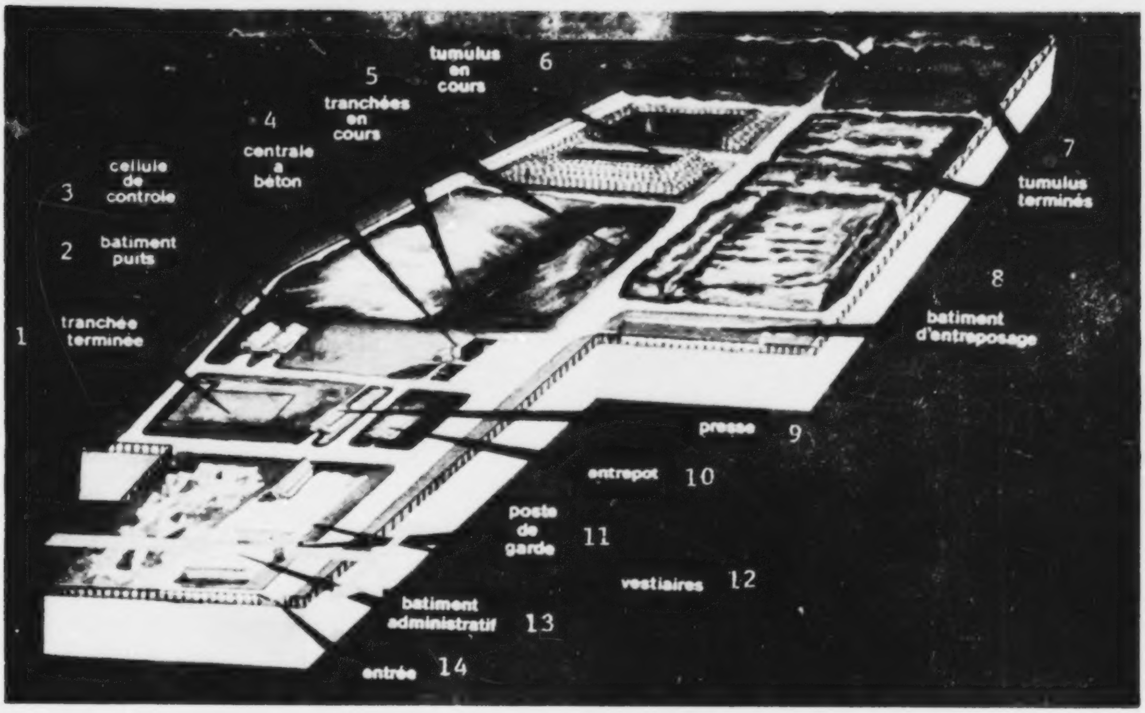
"Most of this waste comes from nuclear power plants, and the rest from fuel-cycle plants, large research laboratories and users of radioelements. This waste, commonly called 'low- and moderate-activity waste,' represents over 90 percent by volume of all radioactive waste, but only 1 percent of total radioactivity.

"The total amount of it produced until the year 2000 will be less than 1 million cubic meters. It is stored on the surface or at very shallow depths at sites like the La Manche Facility.

"At present," ANDRA states, "only short-lived waste is being definitively stored. Radioactive materials are being confined and isolated from the human environment for a sufficiently long period of time to enable their activity to drop to a level at which the potential hazard they represent becomes negligible.

"The overall life of a storage facility for short-lived waste can thus be divided into three phases:

"--The operational period during which the waste is being put in place and the containment structures built. This period may last 10-20 years.


1 tranchée terminée
2 batiment puits
3 cellule de controle
4 centrale a béton
5 tranchées en cours
6 tumulus en cours
7 tumulus terminés
8 batiment d'entreposage
9 presse
10 entrepot
11 poste de garde
12 vestiaires
13 batiment administratif
14 entrée

Key:

1. Completed trench
2. Shaftways building
3. Monitoring compartment
4. Concrete packaging facility
5. Trenches under construction
6. Tumulus under construction
7. Completed tumulus
8. Warehouse building
9. Press
10. Warehouse
11. Guard station
12. Dressing rooms
13. Administration building
14. Entrance

The Facility occupies an area of 12 hectares where the short-lived radioactive waste is stored in containment structures buried at shallow depths (monoliths) or in surface structures (tumuli) that will be covered with a stratum of waterproof clay followed by a loam topping.

Alongside the storage zones are the operations buildings: Administration building, monitoring compartment, compacting press, sheathing station, concrete packaging facility, warehousing facility (temporary warehousing of a few packages containing long-lived waste).

"--The period of surveillance that follows operations. During this period, no more construction work is done (except for any necessary repairs), but surveillance is maintained. The site remains the property of the state and access to it is controlled. This period may last 200-300 years.

"--The period of normalization, during which there is neither surveillance nor intervention. At this time, access to the site can be uninhibited."

The ANDRA brochure provides a mass of detailed information on radioactive waste and on the organization and storage methods used at the La Manche Facility. Its illustrations are profuse, well chosen and contribute to making this brochure an excellent source of information and a good summary document on one of the least-known aspects of this end of the fuel cycle.

[Captions]:

Storage in monoliths: Structural panels are used in the dugout to delimit coffers. A metallic reinforcement frame is placed on the bottom and the cell walls of the compartment to ensure the bonding of the monolith. The packages of waste are then lowered into it by means of a crane.

Storage in tumuli is used over the buried monoliths which form a vast reinforced concrete platform covered with asphalt. The area thus occupied is girded by a trench designed to collect the runoff waters during the construction period, and to enable monitoring of the absence of water infiltration after the structure has been completed.

The storage structures have a dual function: To protect the packages against all attack from the outside and, should such attack occur, to reduce the consequences.

This dual function is performed by a series of "barriers": The earth, clay and gravel of the tumuli, the concrete of the monoliths, the package walls and the material in which the waste is sheathed.

The structures are designed to withstand earthquakes. They are sealed against rain and underground waters. At the base of the monolits and the tumuli, a monitoring network, accessible via underground shafts, enables checking of the waterproofing of the structures. This network is distinct from that which collects rain and runoff waters at the base of the tumuli.

Here, storage takes the form of a tumulus, girded by a trench designed to collect the rainwater that runs off the clay stratum. The clay is topped with loam.

An appropriate vegetational cover is planted in the loam to bind the earth together and provide evapotranspiration.

Here, local vegetation has already started to grow on its own so well that these mounds are becoming naturally a part of the surrounding environment.

9399
CSO: 5100/2135

SOUTH KOREA CHOOSES ALSTHOM FOR NUCLEAR EQUIPMENT

Paris REVUE GENERALE NUCLEAIRE in French Jan-Feb 82 p 88

[Article: "Korea 9 and 10: Alsthom-Atlantique To Furnish the Conventional Portion"]

[Text] South Korea has finally chosen Alsthom-Atlantique to furnish the turbo-alternator sets and other equipment for the conventional portion of Sections 9 and 10 of the country's nuclear program. This choice concludes a very lively competition that pitted against each other the French group, a Swiss company (Brown-Boveri and Company), American companies (Westinghouse and General Electric), a British company (General Electric Company) and a Japanese company (Mitsubishi).

The contract, valued at over $400 million, is to be signed in the very near future. In a release dated 4 December 1981, Alsthom-Atlantique indicates it will provide the engineering of the conventional portions of Korea 9 and 10, while a "sizable portion" of the equipment will be provided by Korean industry.

It is recalled that the reactor cores and the fuel for these two sections will be provided respectively by FRAMATOME [Franco-American Atomic Construction Company] and COGEMA [Nuclear Materials General Company]. The actualization of Korea 9 and 10 will thus be essentially French; the signed contracts will represent a total of almost $1.4 billion.

These two units of the 950-MW(E) class will be installed on the east coast at some 250 km from Seoul. By way of a vast nuclear power program currently under development, Korea plans to have available, by the 1990's, an installed nuclear power capacity of 16,000 MW(E).

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END

JPRS 80804

13 May 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 143

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13 May 1982

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 143

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WEST AUSTRALIA ALP FOR URANIUM EXPORT MORATORIUM

Perth THE WEST AUSTRALIAN in English 22 Mar 82 p 14

[Text] **The State branch of the Australian Labor Party is solidly in favour of a moratorium on the export of uranium.**

A special conference of the State ALP in the weekend voted unanimously in favour of the party's present national policy.

[This calls for a moratorium on uranium mining until after a full public debate on the issues and until adequate safeguards are found.]

The decision of the Australian Council of Trade Unions last December to lift bans on the export on uranium was viewed with concern by some WA unions.

Motions calling for the decision were put forward yesterday by three party branches, the Labor Women's Organisation and the Amalgamated Metal Workers and Shipwrights' Union.

The conference was held to alter its rules in line with the party's national structure decided on last year.

FAVOUR

Under the changes, the number of State delegates will reflect the number of House of Representatives seats in each State. This will favour the big States.

All States were previously represented equally at the national conference—the ALP's supreme policy-making forum.

The local conference also approved rules aimed at increasing the role of women in the party, by ensuring that 25 per cent of elected delegates are women.

A motion put by Senator Peter Walsh calls for changes to the Parliamentary Contributory Superannuation Act to "end Liberal Party abuses."

PREVENTING

The changes are aimed at preventing annual parliamentary pensions being commuted to a lump sum and suspending the pension while the former MP holds a full-time government position.

They would also seek to reduce the pension by 50 cents for every dollar of non-pension income of more than $5000 from any source until only half the pension is payable.

Motions from the State conference will be debated at the party's national conference in July.

CSO: 5100/7526

AAEC REPORT SHOWS DROP IN NATION'S URANIUM RESERVES

Brisbane THE COURIER-MAIL in English 22 Mar 82 p 23

[Text] URANIUM was in the news last week when the Federal Government approved the Jabiluka uranium project in the Northern Territory.

Which made the "Australian Uranium Resources" section in the 29th annual report of the Australian Atomic Energy Commission even more interesting.

The report said Australia's reasonably assured resources at June 30 last totalled 294,000 tonnes of uranium.

This was a decrease in Australian reserves and, more, a decrease expressed as a percentage of the Western world's uranium.

The decrease of 5000 tonnes against the Australian total for the previous year was caused by the production of 2045 tonnes during the year, and to increasing costs, which lowers economic reserves.

Australia's low-cost reserves decreased from about 21 percent of the Western world's low-cost reasonably assured resources at June 30, 1976, to 16 percent in 1980 and 17 percent at June 30, 1981.

The decrease since 1976 reflects the rate at which uranium reserves have been proved in other countries.

The slight increase in 1981 was the result of a decrease in the Western world's reserves of 7 percent due to a substantial decrease in estimates for the United States.

Incidentally, there is a lot of nuclear-based electricity in the world these days.

Around the world there are 243 nuclear power units in operation, 229 under construction and 55 on order.

CSO: 5100/7526

CASTRO MADERO ELABORATES ON NUCLEAR DUMP SITE

Buenos Aires CLARIN in Spanish 17 Mar 82 p 5

[Interview with Carlos Castro Madero, chairman of the CNEA; date and place not specified]

[Text] The chairman of the CNEA [National Atomic Energy Commission], Vice Admiral Carlos Castro Madero, has said that by the end of this decade or at the beginning of the next, Argentina will have what he called a huge storage facility for the final products of the fuel cycle from our national nuclear plan.

After providing a great many details about the place where the facility will be located, in Chubut province, he said that the storage site--he rejected the term of "nuclear dump," calling it incorrect--will arouse "the envy" of countries which do not have such a facility, and said that it will become a factor in our political and economic development.

In an exclusive interview with CLARIN, he said that Argentine environmentalists are actively involved with the CNEA plan, and he rejected a proposal made by the physicist, Jorge Sabato, that a major national debate should take place on this issue.

He said that the project will require investments of "several hundred million dollars," but he added that "the costs of this storage must be included in the cost of generating electricity from nuclear power."

He was unwilling to express an opinion about the possibility that other countries might be allowed to send their wastes to Argentina for storage; he said any comment on his part might tend to arouse controversy.

"That is a political decision," he commented, and "there is no doubt that Chubut province and the nation could benefit by offering the use of this site for the storage of products brought from other countries." Following is a summary of the conversation between Castro Madero and CLARIN.

Question: Some press reports have been speaking of a facility that, at least in Europe, is called a "nuclear dump."

Answer: News about the establishment of a nuclear dump has gotten out, and I must make it clear that the word "dump" is totally inappropriate and misleading. When we hear the word "dump" it suggests that trash is being thrown in a disorderly and uncontrolled manner into a place in contact with the environment, where people who might have some interest in what they could find there could obtain easy access. But the Gastre storage site is very far from being a dump, because it is a highly sophisticated facility.

Question: Has this type of storage facility aroused any sort of conflict?

Answer: There is a great deal of conflict about this issue all over the world. It is paralyzing the development of nuclear energy. The conflict centers on the places where the final products of the fuel cycle should be stored. In this instance, Argentina is taking a big step forward, so that we can be prepared to store these products. To do this, we have conducted studies of the geologically acceptable locations in the country. These studies began over a year ago, after a contract was signed with the University of San Juan.

Question: What are the characteristics of a nuclear storage facility?

Answer: These storage facilities must have two characteristics:

1. They must have great seismic stability;

2. There must be no access for water, which may be an agent of corrosion and conduction.

From the 200 possible places, one was selected, which is located about 50 kilometers away from Gastre in Chubut province. It is a granite formation which has been stable for millions of years, with no access for water. At the appropriate depths of 500 to 700 meters, galleries will be created, where the final products of the fuel cycle will be stored. These products are already being packaged in an appropriate manner. They will be controlled and arranged in these galleries so that they will not affect either the environment or any people who might come into the area.

Question: Does any country in the world now have a storage site?

Answer: No. The Germans have chosen a salt mine, which also meets the requirements of being an area that is geologically very stable, and with no water access. But the German facility is still in the planning phase.

The government of Argentina wants to avoid giving public opinion or groups of environmentalists any cause to question the use of nuclear energy.

These studies in Gàstre were begun during the last 2 years, and the investment is between 40 and 50 billion Argentine pesos.

Question: Is there any urgency about building this storage facility?

Answer: No. Argentina still has no reprocessing plant in operation; such a plant extracts plutonium and uranium, separating them from the final products which must be kept in storage. Argentina is making its plans well in advance, so that when the time comes when we need to reprocess in order to obtain this plutonium so it can be used in fuel elements, we will then have a suitable place in which to store highly radioactive elements.

Question: When will the storage site be operating?

Answer: We think that it may be needed by the end of this decade or at the beginning of the 1990s.

Question: Has the project aroused any reaction from Argentine environmentalists?

Answer: No, not at all. Environmentalists are involved in the ecological studies done for nuclear facilities. In this case, geologists from the University of San Juan are taking part in the project.

Question: I understand that the problem of safety is not limited just to the environment?

Answer: All aspects will be considered. These radioactive materials coming from reprocessing plants have suitable containers which cancel out any possible radiation they may have. After being packaged in these containers, they are taken to the final storage site. In this instance, we have no reprocessing plant. For that reason, the problem of high levels of radioactivity will not exist until the storage facility is built. What is being transported now is done in suitable containers, and the products involved have low levels of radioactivity.

Question: Will the Chubut facility accept nuclear wastes from other countries?

Answer: The storage facility is being built solely for Argentina and its nuclear plan. Nonetheless, the range of possibilities is very broad, and this will depend on a political decision to be made at the appropriate time. Many storage sites are now needed all over the world. This site is for Argentina's nuclear plan. We expect our reprocessing plant to produce highly radioactive elements. The storage site has no connection with any other nuclear program of any other country.

Question: Have the amount of the investments and the source of the funding been determined?

Answer: The project will have to be financed by generating electricity. The cost of storage must be included in the cost of generating electricity from nuclear power. Several hundred million dollars are involved, which will come from megawatts of electricity to be generated. This must cover the cost of the fuel, of uranium exploration and mining, and of the final storage.

Question: But is it possible that some other countries may send their wastes here?

Answer: This plant is going to arouse the envy of countries which don't have one. It will be a factor contributing to our political and economic development. With this storage facility, we will move to the head of countries with nuclear development programs. Saying that we should or should not accept elements from other countries would only stir up controversy.

7679
CSO: 5100/2132

CNEA CHAIRMAN ON EFFECTS OF NUCLEAR BUDGET CUTS

Buenos Aires CONVICCION in Spanish 17 Mar 82 p 11

[Interview with Castro Madero, chairman of the CNEA, 16 Mar 1982; place not specified]

[Text] Yesterday, in an exclusive interview with CONVICCION, the director of the CNEA [National Atomic Energy Commission], Vice Admiral Carlos Castro Madero, said that budget cuts have already caused a 1-year delay in Atucha II, and that now they are trying to avoid any delay in the Embalse plant and in the heavy water plant, which is one of the pillars of the Argentine Nuclear Plan.

Castro Madero, who also pointed out that no final decisions have yet been reached, and that talks are still in progress with the planning department in order to reconcile opposing views, spoke of nuclear detonations for peaceful purposes, relations with the United States and the Club of London, and the project to build a nuclear storage facility.

The conversation is given below:

Question: Vice Admiral, what is a nuclear dump?

Answer: In the first place, I would like to make it clear to you that the term "dump" is totally inappropriate, because it conveys the idea of a place where trash is dumped indiscriminately, in a disorderly way, and left in contact with the environment, without taking any precautions so that human beings will not come into contact with it. What we are planning is to develop a storage facility for the final products of the fuel cycle. The most advanced nations in the western world have the problem of where to store the final wastes of this cycle, and in some cases, public opinion has blocked the operation of nuclear plants that have already been completed. Argentina is now moving ahead in this field, because it is already doing studies for the timely construction of a storage facility. This storage facility, I repeat, is for the final products of the fuel cycle. This means that it is planned to preserve definitively the environment and human beings from any possible harmful effects of fuel cycle products.

Question: At this time, the environmental movement is almost a political activity in some parts of the world. It is possible that news of this development may stir up some criticism or concern in Argentina about contamination or some such problem related to the storage facility. Is there any danger? What controls are used?

Answer: I am actually very concerned about the fact that a political movement might begin to develop in Argentina, hiding behind the environmental movement. The storage facility is a granite geological formation, which must also have a suitable resistance to radiation. Galleries are drilled in this granite formation, down to depths of 500 or 800 meters. There, in a very controlled and orderly fashion, properly packaged products from the fuel cycle are placed, so that there will be no impact at all on the environment. We have chosen an area that meets these requirements; we are going to drill in order to verify that the geological formation does truly meet all the requisites, and this will spur development in a practically deserted area, located about 40 or 50 kilometers from the town of Gastre in Chubut province in the Sierra Mediana mountains. This will also help the development of Patagonia.

Question: At this time, when there are very tight budget restrictions, how could this project be fit into the nuclear plan? Wouldn't it generate new delays, new cutbacks, and further stretch already limited resources? How can this be reconciled with the policy of restrictions being advocated by the finance ministry?

Answer: The cost should not be very high, but obviously, if it is to get started, it must be included in the budget. Fortunately, Argentina is under no pressure to develop this storage site. The project is included in the budget that has been prepared, because we feel that it is not a very large investment, about 40 billion over a 2-year period, but it will obviously depend on the final decision of the executive. In this case, Argentina is moving ahead in order to avoid any problems like the ones we mentioned in relation to the environmental movement. But there can be no doubt that its start could be delayed if the funds are not provided.

Question: The ministry of finance does intend not to grant to the CNEA the 8 billion pesos requested for the current fiscal year. What projects would be affected by a budget cut for this year?

Answer: We are trying to optimize to the utmost the resources that the PEN [National Executive Body] allocates to us. We already know that Atucha II is going to be a year behind schedule. I hope that the cuts will not affect Embàlse or the heavy water plant, but we are still talking with the planning ministry. The planning ministry is still in the process of preparing the budget that will be sent to the executive.

Question: That means that nothing has yet been decided.

Answer: No. Nothing has been settled.

Question: You recently took part in a meeting in Japan, at which all the other participants belonged to the Club of London. Is that fact of political significance, in terms of Argentina's nuclear development moving us ahead in the world, or is it a technical distinction?

Answer: It is a distinction conferred on Argentina, by inviting us to participate along with advanced countries such as France, England, Russia, the United States, and Japan. There the nuclear strategy of each participant was discussed. Argentina's advanced position in nuclear development was recognized, and this enabled us to establish contacts with Japanese officials who are interested in Argentina's nuclear plan.

Question: While you were in Japan, some White House spokesmen said they made no distinction between nuclear detonations for peaceful purposes and nuclear detonations "of other types." This comment was made in reference to your remarks that Argentina would not renounce the use of nuclear detonations for peaceful purposes when necessary. Do you have any response to that?

Answer: The position of the United States is well known. When they ratified the Treaty of Tlatelolco, they said then that there were no distinctions between detonations for peaceful purposes and those for military purposes. But Argentina is totally unwilling to give up the possibility of using nuclear detonations for peaceful purposes.

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CESAR CALS ANSWERS QUESTIONS ON NUCLEAR PROGRAM

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 13 Apr 82 p 36

[Interview with Minister of Mines and Energy Cesar Cals by Carlos Chagas, Milano Lopes, Estelina Farias and Jose Roberto Arruda of O ESTADO DE SAO PAULO; date, time and place not given]

[Text] Minister Cesar Cals, in an exclusive interview with O ESTADO, confirmed that there are reasonable doubts on the jet nozzle project by means of which Brazil seeks to obtain the sensitive technology for enriching uranium and which served as the bases and justification for the German-Brazilian Nuclear Agreement. The minister of mines and energy increased the area of uncertainty on this process even more by saying that it could be ready between 1987 and 1990. In the meantime, we shall continue to import uranium enrichment services.

He also confirmed the charges made by ESTADO and JORNAL DA TARDE in their editions of 28 March and 1 April that the Germans sold Brazil the technology to another process, that of the ultracentrifuge in the preliminary negotiations of the nuclear agreement, later withdrawing the offer under the allegations that URENCO did not allow the transfer of that technology.

Minister Cesar Cals pointed out that the jet nozzle process produces enriched uranium but it is not known at what price. Moreover, energy efficiency comparable to other processes such as the ultracentrifuge or gaseous diffusion is not obtained. He believes, however, the time will come when it must be used, even if it is the most expensive, so as to achieve self-sufficiency. He also confirmed that Brazil is seeking other countries who want to transfer nuclear technology and in addition wants to develop its own research here.

Question: Is it rational to spend $30 billion on a nuclear program based on a presumption? What if it does not work?

Cesar Cals: Look carefully at what you are saying. The nuclear program is not $30 billion, that is, I have eight nuclear powerplants. You have to subtract $24 billion or $16 billion at $2,000 per kilowatt of powerplants, either nuclear or hydroelectric, from that $30 billion. Do not confuse the nuclear technology program with the fuel cycle. Even in the fuel cycle program itself you should only count the jet centrifuge, which should cost from $1 to $2 billion. The remainder is for uranium concentrate which one needs and it is included in the $30 billion. Hexafluroide is needed, so is the fuel element plant and so is NUCLEP [NUCLEBRAS [Brazilian Nuclear Corporations] Heavy Equipment, Inc]. In short, it is not $30 billion; you have to subtract the powerplants and everything that does not depend on the enrichment process.

Dario Gomes: [Dario Gomes is an adviser to Minister Cesar Cals] The question of uranium enrichment is not a hypothesis, it exists in practice.

Question: Has the jet nozzle process already enriched some uranium?

Dario Gomes: It has.

Question: At the laboratory level?

Dario Gomes: Uranium enrichment was tested at that same plant at Belo Horizonte. Professor Becker is now improving the conditions of his process, practically doubling the yield by means of double deflection, which you should also know. That process has been using the same amount of energy and instead of making one separation it makes two, doubling the yield of the system.

Question: Is there still a doubt that the process can produce on an industrial scale?

Cesar Cals: If there were, no one would make an agreement with Brazil but would sell enriched uranium. The question is why sell that technology? Why was the nuclear agreement made? Because for reasons of political questions of the postwar period, Germany was forbidden to install a uranium enrichment plant in its territory. There are certain things which cannot be forgotten. First of all, that is not a process that is readily available; it is a political weapon, particularly political because it can be used for nonpeaceful means. Therefore, they are afraid of disseminating the enrichment process.

Question: What is it the Germans want politically?

Cesar Cals: I believe they want a supply of enriched uranium in a country which has uranium. They also want an important market for other things.

Question: Would the bomb be involved in that?

Cesar Cals: No! They want an important market in other things. When thousands of Brazilians are sent over there for training, you can make—that is my point of view—an important market for other industrial products.

Question: It has been learned that when the Germans negotiated the nuclear agreement they signed a letter of intent, which came to be the basis for the Protocol of Brasilia, and they sold us the technology of the centrifuge. In a subsidiary clause, Brazil pledged to invest $50 million in the development of a process, unknown at the time, called the "jet nozzle." Three months after that preliminary meeting, when the nuclear program had acquired a form and the chain of interests had been created, the Germans return and inform us that they can no longer transfer the ultracentrifuge technology because URENCO refused it. Then, when they sold it to us, did they not know they could not transfer the ultracentrifuge technology?

Cesar Cals: That is the second item, a willingness to transfer.

Question: Do you confirm that story?

Cesar Cals: I read that agreement but I confess I cannot quote all the clauses by heart.

Dario Gomes: I have the impression that it is more or less the story.

Cesar Cals: I find it reasonable to say that the question is that of wanting to transfer.

Question: The changes in the original concept of the jet nozzle project worry nuclear physicists. They say that the delay in the system will be greater, that the details of the project will have to be redone and that orders for compressors, autoclaves, photocurrent plates will also be delayed.

Dario Gomes: The concept of the project did not change. It shall be the same. The gas to be used will be hydrogen in the first cascade and deflexion will be simple, precisely so as to stick to the timetable. From the second cascade on, the system with double deflection and helium gas will be used.

Question: Is that still on the drawing boards?

Dario Gomes: No. Also that pilot plant at Minas Gerais is testing everything; it has that capability. It is a plant where modifications are made and each improvement is introduced and tested before proceeding with a demonstration. When it goes for a demonstration, it is final.

Question: Is the improvement of the process studied in Germany and tested in Belo Horizonte?

Dario Gomes: It is tested by our personnel, who are still over there, and brought here, tested at Belo Horizonte, approved and then introduced into the demonstration plant. You can see it is the logical sequence of an undertaking.

Question: Is the important thing knowing whether that technological advance resulted in an effective saving by comparison with the ultracentrifuge and gaseous diffusion processes?

Cesar Cals: That is what we hope. But even if it is not successful, we did not have the other processes available, even if it was not the one which used the most energy. That is why I put things this way: Is there a willingness to transfer?

Question: You could add a fifth item to the sequence: Does the time come when it is necessary to use a technology even if it is more expensive than the others?

Cesar Cals: Obviously, if you want to be independent you have to have those energy sources. For example, do you believe the liquified coal of South Africa is economical? It is not. Why are they using it? Because that is the solution.

Question: Until such a time as Brazil is in a position to enrich its uranium does it have the guarantee that URENCO is going to supply enriched uranium?

Cesar Cals: It will for Angra I.

Question: What about the rest?

Cesar Cals: We expect that by 1987 we shall have the first phase of the demonstration plant in operation for the rest.

Question: Does that mean that the initial load for Angra II will be nationally produced?

Cesar Cals: We expect it to be ours.

Question: Some people say that the process of transfer of technology is being sold to us as if it were a "Hydra-headed monster." The uranium enrichment principle is supposedly simple. The greatest difficulty would be in welding, the special solders for the large industrial units, of very special metal alloys. That technology is not being absorbed by our industry because the process is not being spread to the Brazilian industrial park. Therefore, will technology remain on paper?

Cesar Cals: It is not necessary to produce everything, the necessary thing is to be able to do it. We are going to purchase zircalloy from Argentina. Moreover, it is easier to have another country make the solder than to remain without the enrichment process, obtaining only enriched uranium. The Germans themselves buy that solder in Japan.

Dario Gomes: The casting part in the majority of countries is done in Japan. Today, generally, there is not only the nuclear industry, there are countries which specialize in certain components, with a constant exchange of industrial items.

Question: You said there was an alternative for enriching uranium, that we are doing our own research, in that respect, what was done with the project of Professor Sergio Porto?

Cesar Cals: The National Nuclear Energy Commission continues to do all research. Work is continuing in all areas.

Question: Does that mean we are developing our own uranium enrichment process?

Cesar Cals: We are working. We are not forced to remain with only one process. If tomorrow we wanted to, or could, buy a new process, there is nothing that calls for one exclusively.

Question: Are you confident that the new process would be good enough for the installation of an enrichment plant at Itataia?

Cesar Cals: I have not decided that it should be in Itataia. My decision is conceptual. I believe that Brazil should prepare for being an exporter of enriched uranium. Between 1990, or a little after that, and the year 2040, the industrialized world will obtain its electric power from nuclear fission sources. At that time, according to what I have been told, the enriched uranium market will be a seller's market. Therefore, since Brazil has a large reserve already found, it is enough for creating a plan for the export of enriched uranium economically. Why enriched uranium? Because the prices for it show that not only is it more economical, it is more profitable: It is selling for $1,560 a kilo. I believe we should have it, not only because it is more economical, but because it is power. Just as the other countries condition the supply of enriched uranium to some others, we shall at that time have more power than the petroleum producing countries have now.

Question: It is frequently asked: "When will there be openness in the nuclear program?

Cesar Cals: There is total openness, never has so much been said. The Ministry has no secrets.

Question: Why does NUCLEBRAS not publish its accountings in the newspapers as is required by the Law on Corporations? No one knows up to now how much was spent on the nuclear program.

Cesar Cals: If you want any information I will give it to you.

Question: Six months after you took over the Ministry, you issued a decree classifying several items in the nuclear program as "secret, confidencial and restricted." Could that be the reason for the lack of information?

Cesar Cals: On the contrary, I am completely open.

Question: Senator Virgilio Tavora, when be read the nuclear agreement in the Congress, after he concluded the justifications for it, said: "I am not going to read the shareholder agreements or the annexes to the agreement because they are tiresome reading, however all those documents will remain at the disposal of the National Congress." Nothing more was ever heard of them...

Cesar Cals: I sent everything to the CPI [Congressional Investigating Committee].

Question: But everything classified "secret?"

Cesar Cals: It was no secret. You must understand that commercial agreements should not be made known to other countries for all the world to know. Not even the technological agreement of Voith of Germany with the Voith here is known. After all, they are commercial agreements. When we sent them to Congress, we sent them to secret sessions, so that the nation would learn of them through their representatives. Now the newspapers cannot be called and informed because on the following day all the ambassadors of all the countries would have access to them.

Question: However, all those agreements are published in Germany. All you have to do is go to the Chamber of Commerce of a German city where there are companies which belong to the program and ask for a copy. Is secrecy only extant in Brazil? Did you not know that NUCLEBRAS does not publish its accountings?

Cesar Cals: I knew it.

Question: Is it not required to do so by the Corporation Law?

Cesar Cals: It has a special law.

Question: Which does not require publications of accounting?

Cesar Cals: Right.

Question: Why, Minister?

Cesar Cals: I did not make the law, it was a legislator.

Question: Do you believe it is a case of national security?

Cesar Cals: I believe the nuclear policy in Brazil is part of the Ministry of Mines and Energy, the National Security Council and the Ministry of Foreign Affairs. Nuclear Policy is the policy of the three.

Question: Would you accept negotiations of another nuclear program with another country, for example, France?

Cesar Cals: We already entered into one with Italy for fast reactors, the "breeders."

Question: And the sensitive technology, would you accept another negotiation?

Cesar Cals: I would accept it. I believe Brazil, if there is a country which wants to transfer technology, has no difficulties. It only depends on knowing whether it would be economical to do that.

Question: Are we looking abroad for someone to offer us nuclear technology?

Cesar Cals: We have personnel outside the country who are permanently exchanging information, including in the International Atomic Energy Agency in Vienna.

Question: Uranium enrichment is a basic part of the technology transfer process of the Brazilian nuclear program. It is knowing that we are facing many problems in that area, with successive postponements in the jet nozzle process.

Cesar Cals: I must say that initially the pilot plant, which was disassembled by Brazilian technicians, who were working with it in Germany, is being assembled in Belo Horizonte and has already begun operations. Actually what is being said is that it is a process which uses large amounts of energy. It does enrich uranium but with a large use of energy. There is an expectation that the technological development of that process will lead to a reduction in the use of energy to levels which are compatible with that of other processes.

Question: What about changes in the original concept of the project?

Cesar Cals: I do not want to get into the analysis of that project because, after all, I am not a technician.

Question: Physicists say the machine in Belo Horizonte produces no enriched uranium at all.

Cesar Cals: It is a pilot machine for laboratory tests only. The first demonstration plant is being built in Resende. There seems to be no doubt about the jet nozzle process. There may be doubts on the energy efficiency of the process.

Question: After seven years that energy efficiency should have taken some steps. Initially it was 10,500 kw/hour per SWU, which means practically five times more than the gaseous diffusion process and more than 20 times that of the ultracentrifuge. Compared to the other two processes, the jet nozzle was extremely unfavorable.

Cesar Cals: I look at things in another light. You favor the learning of a technology or the development of our own technology or for the absorption of imported technology. To transfer a technology four items are required: First, someone who has it; second, someone who wants to transfer it; third, someone who is able to receive it, and fourth, someone who can pay for it. Now there are other processes for enrichment if there is a desire to comply with the second item, that is, someone who wants to transfer it.

Now the only one who wanted to transfer it was Germany, which has that technology. The second item was eliminated: That of wanting to transfer. We must place people capable of learning. However, we already had people who were capable, who went over there, were trained, operated the enrichment plant, disassembled it, supervised the disassembly and are, therefore, capable of learning. Finally, Brazil can pay for it.

Question: The problem we are addressing is that neither we nor the Germans can answer the following question yet: When will the jet nozzle process be in operation commercially?

Cesar Cals: We say that we expect it to be between 1987 and 1990. We cannot say yes or no, we simply wait. The presumption in any process of technological development is that it normally has no timetables. When you say that nuclear fusion will be in operation in the year 2040, it could be in operation in the year 2035 or in 2045. It is a presumption.

Question: From what can be seen, we are in a more solid position than the Germans because in November of last year I was visiting that research work over there and I asked the technicians when the jet nozzle would go into operation and they said they did not know yet.

Cesar Cals: However, our technicians believe that between 1987 and 1990 we shall have knowledge of the enrichment process.

Question: Does that mean that the jet nozzle process can actually be transferred to Brazil as of 1990?

Cesar Cals: That means that we can be operating with an economical yield in Brazil in 1987, which is the timetable, but I am using 1990 as a natural limit.

Question: How about the uranium enrichment plant you are seeking to install at Itataia in Ceara? Will it have the jet nozzle technology?

Cesar Cals: We are going to see whether it will be that process or another. It could be another. Our personnel continues to make other research.

Question: Could it be a turn key plant such as the one France offered Brazil?

Cesar Cals: France, like the United States, does not want to transfer technology. We do not want any turn key deal.

Question: In no way?

Cesar Cals: We only want uranium hexafluoride at this time because the enrichment technical development may not have a timetable for operating commercially, but we do need hexafluoride. What we want is to learn the technology. We are convinced, and it is another phrase I have already said and am going to repeat: Whoever has energy has power and whoever knows the technology of its energy sources has an instrument of common usage. I will say with all sincerity: There was a case, and you know which one, in which Brazil contracted for a reloading of uranium for Angra I. After the contract was signed, at the time for the delivery of the uranium, other conditions were required. Therefore, the country that does not know the technology of its energy sources will always be subject to the political decisions of the other countries which have it. It is a Brazilian decision to learn the technology of nuclear energy.

Question: Taking into consideration that everything will work, that the jet nozzle process is approved and goes into operation at the demonstration plant at Resende, the annual production of that plant would be 64 tons per year, which would not even be enough for supplying the reactor of Angra 2 which requires 100 tons, would we exchange the present dependence on petroleum for that of uranium?

Dario Gomes: (adviser for nuclear affairs to the Ministry of Mines and Energy) The Resende plant is being built in modules and the modules are going into operation, at a yearly rate which is unknown to me.

Cesar Cals: It is like the Itaipu Plant, you have one machine today, another four months from now, and so forth.

Question: When do you believe, then, that we shall eliminate the need to purchase uranium enrichment service abroad?

Cesar Cals: Around 1990.

Dario Gomes: I have the impression that it will be exactly then. With today's program of nine units, we shall practically be producing all the loads here in 1990.

8908
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BRAZIL

GERMAN OFFICIAL SAYS JET NOZZLE PROCESS ALREADY VIABLE

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 7 Apr 82 p 29

[Article by Assis Mendonca: "Brazil Preferred the Jet Nozzle, Declares German"]

[Text] Bonn--The decision to adopt modifications in the uranium enrichment system was made principally by the Brazilian side on the basis of an evaluation of the advantages and disadvantages of the use of hydrogen and helium, declared Wolf Schmidt-Kuester, official of the German Ministry for Research and Technology, in Bonn yesterday. According to him, the jet nozzle process is completely developed and present research being done pursuant to the nuclear cooperation agreement is aimed exclusively at an even better technological advance, primarily in that which has to do with productivity and production costs. At the present stage of development, the German uranium enrichment process operates at a cost which is higher than the cost of the gas centrifuge system and practically the same as the gaseous diffusion system, a method suitable only for large-scale production, however.

According to Schmidt-Kuester, the jet nozzle system was developed with the use of helium, passing on later to the use of hydrogen with the aim of reducing production costs. This, however, would have meant greater expenditures in construction work since it is ncessary to adopt expensive measures for preventing explosions. For this reason, German and Brazilian technicians elected to return to the use of helium, the Brazilian side having made the final decision. This does not imply, in the understanding of the official of the Ministry for Research and Technology, any lag in the uranium enrichment process and should raise no doubts as to its operation. We do not have the slightest doubt that the powerplants will strictly accomplish the task for which they were built," he declared.

As to the possibility of Brazil obtaining URENCO gas centrifuge technology, Wolf Schmidt-Kuester said that such a possibility never existed, nor does it exist now. URENCO is a firm belonging to the German, Dutch and British Governments and the Germans cannot individually avail themselves of the technology developed by it. At this time there is no indication the Dutch and British Governments are going to change their position of restrictions on providing Brazil with that technology. However, URENCO has assumed the responsibility for providing enriched uranium to NUCLEBRAS [Brazilian Nuclear Corporations] for keeping Brazilian reactors in operation as long as there is no national production of nuclear fuel.

As far as Wolf Schmidt-Kuester is concerned, the Brazilian decision to undertake a work of cooperation in improving the German jet nozzle process was correct because it guarantees the country, not only the construction of uranium enrichment plants and the possibility of a future increase in production, but also the learning of the complete nuclear fuel cycle, making Brazil independent of foreign supplies in that area.

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GERMAN OFFICIAL DENIES OFFERING URENCO TECHNOLOGY

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 15 Apr 82 p 31

[Article by Assis Mendonca: "Germany Denies Having Negotiated Another Process"]

[Text] Bonn--Germany never promised or negotiated URENCO uranium enrichment technology, the ultracentrifuge, with Brazil, declared Emil Gruber, official in charge of bilateral relations in the German Ministry for Research and Technology, yesterday. He participated in all negotiations of the nuclear agreement, including the preliminary. He said the Germans did not offer the ultracentrifuge to Brazil at any time "for a number of reasons."

The German Government official explained that the Brazilian side showed an interest in the URENCO process but was informed that Germany could not avail itself of it by itself and soundings made with the three-nation company revealed that Great Britain, and particularly Holland, were not willing to give the ultracentrifuge to Brazil.

Moreover, argued Gruber, the development of the URENCO process was in its final phase of development, which made it difficult to include Brazilian technicians. "Brazil would always be running behind the others," he added, "since it would not be acceptable to have to begin at zero again just so the Brazilians could follow the research."

Co-owner

The Ministry of Research and Technology official says there was agreement on the decision to develop the jet nozzle process jointly with Germany. That technology was very new when the two countries signed the cooperation agreement and this allows Brazil to participate completely in its development, also becoming co-owner of the process with all the rights to avail itself of it. "That is the way," said Gruber, "that the transfer of technology is accomplished."

If perhaps it would have been possible at the time to negotiate an ultracentrifuge, Brazil would have received a technological "Black Box" in whose development it did not participate and on which it would not have a complete knowledge for that reason, according to Gruber. The jet nozzle, on the other hand, is a German-Brazilian technology on which Brazilian and German technicians are working and on which Brazil will have all the rights of a co-owner.

Gruber does not believe there will be a delay in the Brazilian nuclear timetable because of the adoption of a technology for enriching uranium which ~~is~~ still being developed. "Even if the URENCO technology had been transferred to Brazil, there would not yet be any commercial powerplant in the country, because there is no interest in creating a supercapability in production," he declared.

Becker

Professor Erwin Becker, inventor of the jet nozzle process, is also of the opinion that joint development of this technology will allow Brazilian technicians to have a better understanding of the process than would the purchase of a ready-made system such as the ultracentrifuge. According to Becker, there is the additional benefit of the acquisition of co-ownership rights because of the joint research "in which Germany has also spent much money," aimed at the construction of a uranium enrichment plant.

"We are convinced the decision was correct," said Becker, "Brazil will not just have any technology, which may perhaps work some day, but rather an excellent technology." Its use in commercial powerplants, according to the professor, may possibly be delayed because of the needs of the uranium market, which are not as great as was previously estimated. The commercial use of the process, however, is guaranteed.

The pilot plant at Resende, in turn, will guarantee supplies for one reactor as of 1986 and for three reactors as of 1988, said Erwin Becker. In this manner Brazil would be assured of independence from enriched uranium supplies from abroad within the time periods stipulated from the beginning.

No Comment

Unlike Emil Gruber, official of the German Ministry for Research and Technology, and Professor Erwin Becker of the Nuclear Research Center of Karlsruhe, who replied in indirect manner to statements by Minister Cesar Cals to ESTADO, a Ministry of Foreign Affairs spokesman yesterday refused to make any comment on the subject, alleging that he did not know the text of the interview with the minister of mines and energy.

The Ministry of Foreign Affairs spokesman restricted himself to stating that Germany has complied, and will comply, with the commitments assumed through the signing of the bilateral technical cooperation agreement. In the specific case of the transfer of nuclear technology, he explained the agreement stipulates the construction of uranium enrichment and reprocessing pilot plants and that the timetable agreed upon between the two parties is being met.

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NONRADIOACTIVE STEAM LEAK CONFIRMED AT ANGRA I

Sao Paulo FOLHA DE SAO PAULO in Portuguese 2 Apr 82 p 21

[Text] Rio—The director of the National Nuclear Energy Commission [CNEN], Rex Nazareth Alves, yesterday confirmed the leaking of nonradioactive steam at the Angra I nuclear powerplant due to the operating failure of a valve. It was necessary to shut down the powerplant from 1400 to 2030 on Tuesday as a precautionary measure while the defect was being repaired.

Angra I returned to normal operation and has already reached 5 percent of its power, although it is not yet generating power because the steam produced is being blocked by a valve which prevents its passing on to the turbines. The increase in power to 10 percent, when the powerplant will begin to generate power and be sinchronized with the distribution system, was scheduled for day before yesterday, but up until 1800 yesterday the power had not been raised.

Nazareth Alves stated that tests are made to confirm the operation of equipment, it therefore being normal to make these readjustments. However, the Furnas Electric Powerplants press office denied the leak day before yesterday, although technicians at the powerplant confirmed the incident.

The CNEN director also guaranteed that the tests were being made with the maximum of care and without haste. The defect noted could be repaired with Angra I in operation, even if the power being produced were higher, but it was shut down as a safety measure.

Rex Nazareth Alves revealed that the powerplant will be shut down for a period of 40 to 50 days when it reaches 30 percent of its power so that all measurements and checks of equipment may be made. Subsequently it will begin to operate again at 30 percent of its power until it is safe to increase its capacity.

The steam leak was noticed at 1400 Tuesday by a circulating operator, the plant being immediately shut down. One of the valves, of a total of 150 similar valves, showed a failure at a joint, said Nazareth Alves, but there was no leakage of radioactivity because the equipment is located in the pipes between the steam generator and the turbine. This type of defect does not compromise the safety of Angra I because the water circulating in this place is not radioactive.

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NEED FOR 13 NUCLEAR POWER PLANTS SEEN FOR 2020

Brussels LE SOIR in French 2 Apr 82 p 8

[Article by G. Dt.: "Will 13 Nuclear Power Plants (1.3 Megawatts) Be Needed in Belgium Before 2020?"]

[Text] On the eve of the parliamentary debate on energy, an "explosive" document has been published. CORE, an econometric research center at the Catholic University of Louvain, has issued a long paper on the energy future of Belgium and the impact of energy savings and new technologies. Its conclusion: Before 2020 it will be necessary to build 13 new nuclear power plants of 1.3 megawatts each in Belgium. Moreover, the center's mathematical model does allow for the impact of an energy plan for energy savings and expansion of urban heating.

Admittedly, it is only a somewhat academic study whose hypotheses can easily be disputed, but it is obvious that the issuance of such a document "sponsored" by the European communities and enjoying the support of the scientific policy services will be exploited by the "pro-nuclear" people. We would guess that in the government itself, Messrs Knoops and Maystadt will interpret this study differently.

In order to make a "good model" you need good hypotheses, and it is clearly at this level that the study is weakest. It foresees, for example, an increase in primary energy demand of 2.39 percent per year between 1985 and 1990, which appears high. This increase would diminish thereafter, and consumption would only increase by .2 percent a year after 2000, when the economy measures would achieve full effect.

In the next 40 years we will see a very significant trend from petroleum and gas to coal and especially toward nuclear energy. Petroleum's share in our energy supply will decrease from 50 percent in 1980 to 32 percent in 2020. The share of gas will decline from 21 percent to 7 percent, coal will stay the same, and the share of nuclear energy will shoot up from 5 percent today to 39 percent of our energy supply in 2020.

We will then truly have entered an "all-electric" era, with more than 25 percent of home heating being electric. All these extrapolations result from optimum economic calculations. The study also estimates the cost of a prolonged nuclear moratorium. If we do not construct any more nuclear power plants in Belgium from now until 2020, that will cost us 200 billion 1980 francs for the whole period, because we will have to use more expensive energy.

These predictions imply that, in addition to the 7 nuclear power plants now existing or under construction, we should build 13 new plants of 1.3 megawatts each. It is here, obviously, that the shoe pinches. The study totally neglects certain policy considerations: What sites could still be found? Would it not be dangerous to put all our eggs in one basket? What would happen in case of a serious accident in a nuclear power plant? Wouldn't we have to shut down all production for a period, like we grounded all DC-10's for several weeks when a consistent manufacturing defect was detected? Moreover, what about the enormous draw on the capital market which such investments would entail? The CORE study also analyzes the impact of energy economies and new sources of energy.

The study ranks these methods in order of effectiveness. Energy economy emerges as by far the most productive, particularly insulation of buildings and measures in the concrete and glass industries. Much further behind would come conversion of industries to coal, underground gasification, production of hydrogen nuclear-electric power, urban heating, and the heat pump. Only at the tail end of the ranking do we find the soft energy sources (sun and wind).

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CURRENT, FUTURE NUCLEAR POWER PLANTS LISTED

Duesseldorf ATOMWIRTSCHAFT/ATOMTECHNIK in German Apr 82 pp 215-231

/Unattributed Article/

Part I of the Report on Building Construction and Building Projects in Europe

> /Text/ The special report, which the ATW (Atomic Business) publishes annually concerning "New Nuclear Power Plants" contains tabular surveys and individual status reports concerning all nuclear power plants that are under construction or that are being planned, according to the most recent status. Furthermore, a summary report is given concerning installations already in operation. Although a new power plant (KKG) was put in operation at the end of 1981, stagnation prevailed in the expansion of nuclear energy, since no new orders and no new construction approvals were issued. With most of the blocks under construction, there was a further delay of the expected date of start-up.

Introduction

The stagnation in the expansion of nuclear power plant capacity in the Federal Republic of Germany also continued in 1981, even though the start-up of the 1300 MWe Plant at Grafenrheinfeld (KKG) at the end of the year marked the first new operation of a nuclear plant in 3 years. However, in 1981 and in the first quarter of 1982, no construction approvals and no new orders were issued[1]. In the Federal Republic of Germany there are thus 15 nuclear power plant blocks in actual operation now, with a total of 10,358 MWe gross and 9,450 MWe net.

Efforts to accelerate the approval process for nuclear power plants were continued. On 14 October 1981, the Federal Government approved a catalog of criteria, coordinated with the provinces, which completed the examination announced by the Federal Chancillor in his governmental promulgation of 24 November 1980, how the approval procedures could be accelerated without impairing safety and legal protection. The process has been made more efficient here in a very significant aspect, because several power plants can be designed uniformly (standardization). On 11 February 1982, the Federal Minister of the Interior reported to the Parliament that he would grant to the responsible provincial agencies his approval, as required by the Atomic Law, for issuing the first partial construction permit (TEG) for three nuclear power plant projects designed in this fashion ("Convoy"). This involves the projects KKE Emsland, KKI-2 Isar, and Biblis C.

Expected Start-up of Nuclear Power Plants in the FRG 1982-1991 (Status: March 1982)

Kernkraftwerke (a)	MWe brutto In Bau²) (b)	MWe brutto Projekt (c)	Inbetriebnahme in den Jahren (Zuwachs in MWe)¹) (d) 1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
KKK Krümmel	1 316			1 316								
Mülheim-Kärlich	1 308					1 308						
KWG Grohnde	1 361					1 361						
KRB II B Gundremmingen	1 310				1 310							
KRB II C Gundremmingen	1 310					1 310						
KBR Brokdorf³)	1 365							1 365				
KWS-1 Wyhl⁴)	1 362								6)			
THTR-300 Uentrop	308				308							
SNR-300 Kalkar	327						327					
KKP-2 Philippsburg	1 362					1 362						
KKH Hamm⁷)		1 301									7)	
KKE Emsland⁷)		1 301							1 301			
Biblis C		1 314								1 314		
GKN-2 Neckarwestheim		1 301									1 301	
Neupotz A⁵)		1 374										1 374
KKI-2 Isar		1 350							1 350			
KRL Pfaffenhofen		1 368									1 368	
Gesamt (17 Blöcke) (e)	11 329	9 309	—	1 316	1 618	5 341	327	1 365	2 651 (7)	1 314	2 669 (7)	1 374
	20 638											

Key: a. Nuclear power plants
b. Under construction
c. Planned
d. Start-up in the years (increase in MWe)¹)
e. Total (17 blocks)

1) Date for transfer to the operator.
2) This is a listing of all installations for which the initial partial construction permit (TEG) has been issued.
3) Because of legal construction stops, the construction work was interrupted from 17 December 76 through 6 February 81.
4) Construction work has been interrupted since 19 February 75 (Occupation of the construction site and legal decision).
5) Start-up 6 years after effectiveness of the first TEG.
6) Because of delays in the approval process, the planning is being revised.
7) Of the two projects KKH and KKE, that one should be begun first which first receives an executable first TEG. The other one should then follow about 2 years later.

At this time (and at the end of 1981), 10 nuclear power plant blocks are thus under construction with a total of 11,329 MWe gross and 10,711 MWe net. With one of these plants (KWSWyhl), construction continues to be legally held up; in the appeal, the Superior Court at Mannheim, contrary to previous expectations, has as yet rendered no verdict. For the rest, the numerous superior court litigations which continue against nuclear power plants in 1981 have as yet caused no interruption of the construction work. Construction on the Brokdorf Nuclear Power Plant (KBR), which had been legally interrupted since December 1976, could again be resume on 6 February 1981. However, with the majority of installations under construction, a further delay of the expected dates for start-up has occurred. These are apparent from the tables "Expected Start-up of Nuclear Power Plants" and "New Nuclear Power Plants".

The number of nuclear power plant projects, which can be regarded as concretized, at this time comprises 10 blocks with a total of 13,211 MWe gross. Of this, applications for the first TEG have been submitted for 9 blocks (3 already in 1974, another 3 in 1975, and 1 each in 1977, 1978, and 1979). For 7 of these projects, with a total of 9309 MWe, the expected start-up dates vary between 1988 and 1991.

In summary, the following status (March 1982) emerges for nuclear power plants that are in operation, under construction, or being planned in the Federal Republic of Germany:

In operation	15 plants with	10,358 MWe gross
Under construction	10 plants with	11,329 MWe gross
Planned*	10 plants with	13,211 MWe gross
Total	35 plants with	34,898 MWe gross

*Of this, construction permits have been requested for 9 blocks with a total of 12,843 MWe, and orders (or letter of intent) for 4 blocks with 5,339 MWe.

This ATW report and its tables are again based on replies from the utility enterprises and reactor construction companies to a questionnaire of the ATW, as well as on other information available to the editorial staff.

1. Nuclear Power Plants in Operation

A survey of the most important dates of the 15 nuclear power plants that are currently operating in the Federal Republic of Germany is given in the table below. Since the recently operational KKG will supply power only beginning in 1982, the gross power generation for 1981 derives from 14 blocks and amounts to 53,370,341 MWh. It therefore exceeded the previous year by 21.7 percent (1980: 43,857,329 MWh gross), and reached a fraction of 17.4 percent of the generation of the public power supply in the Federal Republic of Germany. The fraction of nuclear energy in the primary power consumption increased to about 4.6 percent (1980: 3.6 percent). As compared to the previous year, the total consumption was reduced by about 5 percent from 371 million t SKE (antracite units).

The highest gross generation among the German nuclear power plants in 1981 was again achieved by the KKU with 9548 GWh. As in the previous year, this was the highest generation of a nuclear power plant block in the world. Then followed Biblis B with 8594 GWh (simultaneously the second highest generation in the world in 1981), followed by Biblis A with 7245 GWh, GKN with 6355 GWh, KKB with 4688 GWh, KKS with 4657 GWh, KKI with 4337 GWh, KWW with 3793 GWh, and KWO with 2525 GWh.

Nuclear Power Plants in Operation in the Federal Republic of Germany (Status: March 1982)

Name (a) Standort (b)	Dimension	VAK Kahl	MZFR Karlsruhe	AVR Jülich	KWO Obrigheim	KKS Stade	KWW Würgassen	KNK II[3] Karlsruhe	Biblis A Biblis	GKN-1 Neckarwestheim	Biblis B Biblis	KKB Brunsbüttel	KKI-1 Ohu	KKU Unterweser	KKP-1 Philippsburg	KKG Grafenrheinfeld
Typ (c)		SWR	SDWR	HTR (Kugelhaufen)	DWR	DWR	SWR	Na-gekühlt, schnell	DWR	DWR	DWR	SWR	SWR	DWR	SWR	DWR
Kommerzielle Inbetriebnahme (d)		11.61	12.66	1968	4.69	5.72	1972	1978	2.75	12.76	1.77	11.76	3.79	9.79	3.80	(1982)
Therm. Reaktorleistung (e)	MWth	60	200	46	997.5 (1050[2])	1892	1912	58	3517	2497	3732	2292	2575	3733	2575	3782
Elektr. Leistung brutto (f)	MWe	17	58	15	300 (345[2])	662	670	21.35	1204	855[7]	1300	805	907	1300	900	1299
netto (g)	MWe	15	51	13.2	283 (328[2])	630	640	17.75	1146	810[8]	1240	770	870	1230	864	1225
Kühlmittel (h)		H_2O	D_2O	He-Gas	H_2O	H_2O	H_2O	Na	H_2O	H_2O	H_2O	H_2O	H_2O	H_2O	H_2O	H_2O
Moderator (i)		H_2O	D_2O	C	H_2O	H_2O	H_2O		H_2O	H_2O	H_2O	H_2O	H_2O	H_2O	H_2O	H_2O
Brennstoff (j)	(k)	UO_2 anger.	U nat.	UO_2 anger. + ThO_2	UO_2 anger.	UO_2 anger.	UO_2 anger.	PuO_2-UO_2 anger.	UO_2 anger.	UO_2	UO_2	UO_2	UO_2	UO_2	UO_2	UO_2
Leistungsdichte (l)	kW/kg U	10.8	16	30[1]	25.7 (29.9[2])	33.7	22.1	95.5[4]	34.7	39.5	36.7	22.1	22.5	36.7	22.3	36.4
Regelung, Abschaltung (m)(n)		(o) Regelstäbe	(p) Regelstäbe Moderatorabsenkung	(q) Regelstäbe Bor-Graphit-Kugeln	(r) Regelstäbe Borsäure	(r) Regelstäbe Borsäure	(s) Regelstäbe	(s) Regelstäbe	(t) Regelstäbe Borsäure	(t) Regelstäbe Borsäure	(t) Regelstäbe Borsäure	(u) Regelstäbe Umwälzregelung	(u) Regelstäbe Umwälzregelung	(t) Regelstäbe Borsäure	(u) Regelstäbe Umwälzregelung	(t) Regelstäbe Borsäure
Reaktorkühlsystem (v)		indirekt (w)	2 Kreisläufe (x)	1 Kreislauf (y)	2 Kreisläufe (x)	4 Kreisläufe (z)	direkt	(aa) 2 Primärkreisläufe 2 Sekundärkreisläufe	(z) 4 Kreisläufe	(bb) 3 Kreisläufe	(z) 4 Kreisläufe	(cc) 4 int. Axialpumpen	(dd) 8 int. Axialpumpen	(z) 4 Kreisläufe	(ee) 4 int. Axialpumpen	(z) 4 Kreisläufe
Kühlmitteltemperatur Eintritt/Austritt (ff)(gg)	°C	285	254/280	270/950	283/310 (282/312[2])	288.6/316.4	285.6[5]	327/360	284.7/316.6	287.7/321.2	290.1/322.9	215/285.4	270/287	289/323	270/286	291.3/326.1
Kühlmitteldruck (hh)	bar	71	115	11	145 (140[2])	158	71	6.54	155	155	155	69.6	72.4	155	69.7	158
Dampfzustand Druck/Temp. (ii)(jj)	bar/°C	40/250	33/238	71/535	50/267.7 (55/268.7[2])	53/266.2	71/285	69/485	49/263.6	58.6/274	53.3/268.7	69.6/285.4	70.6/286.4	56/269	70.6/286.4	69/284.5
Betriebszustand (kk)		(ll) im abgesch. Zustand	(mm) unter Last	(mm) unter Last	im abgesch. Zustand	im abgesch. Zustand	im abgesch. Zustand	im abgesch. Zustand	im abgesch. Zustand	im abgesch. Zustand	im abgesch. Zustand	im abgesch. Zustand	im abgesch. Zustand	im abgesch. Zustand	im abgesch. Zustand	im abgesch. Zustand
kumulierte Stromerzeugung seit Inbetriebnahme bis 31.12.1981 (nn)	GWh	1792	4757	1100	(ll) 31267	47565	24983	197	67210	28061	36576	12420	16714	28614	4036	–

[1] kW/kg U + Th
[2] ( ) nach Leistungserhöhung
[3] Als KNK-I mit thermischem Kern von 1973 bis 1974 in Betrieb
[4] U + Pu
[5] Austritt aus Druckbehälter
[6] ( ) = geplant.
[7] Davon 498 MWe Drehstrom (DS), 157 MWe Bahnstrom (BS).
[8] Davon 653 MWe DS, bei BS netto gleich brutto

SWR = Siedewasserreaktor
SDWR = Schwerwasser-Druckwasserreaktor
DWR = Druckwasserreaktor
HTR = Gasgekühlter Hochtemperaturreaktor

(Key on following page)

Key:
a. Name
b. Location
c. Type
d. Commerical Start-up
e. Thermal reactor power
f. Electrical power gross
g. Net
h. Coolant
i. Moderator
j. Fuel
k. Enriched
l. Power density
m. Regulation
n. Shutdown
o. Control rods
p. Control rods, moderator temperature
q. Control rods, boron-graphite balls
r. Control rods/boric acid
s. Control rods
t. Control rods/boric acid
u. Control rods/rotary control
v. Reactor cooling system
w. Indirect
x. 2 loops
y. 1 loop
z. 4 loops
aa. 2 primary loops, 2 secondary loops
bb. 3 loops
cc. 8 int. axial pumps
dd. 8 int. axial pumps
ee. 9 int. axial pumps
ff. Coolant temperature °C
gg. Entry/exit
hh. Coolant pressure
ii. Steam conditions:
jj. Pressure/temperature
kk. Fuel charge
ll. In the shutdown state
mm. Under load
nn. Cumulative power generation from start-up until 31 December 1981

1) kW/kg U + Th.
2) () after power increase.
3) As KNK-I with a thermal core in operation from 1973 to 1974.
4) U + Pu.
5) Exit from the pressure vessel.
6) () = planned.
7) Of this 698 MWe three-phase current (DS), 157 MWe traction current (BS)
8) Of this 653 MWe three-phase current, for traction current, the net equals the gross.

SWR = Boiling water reactor
SDWR = Heavy water pressurized water reactor
DWR = Pressurized water reactor
HTR = Gas cooled high temperature reactor

Time Availability of Nuclear Power Plants in the Federal Republic of Germany
31 December 1981

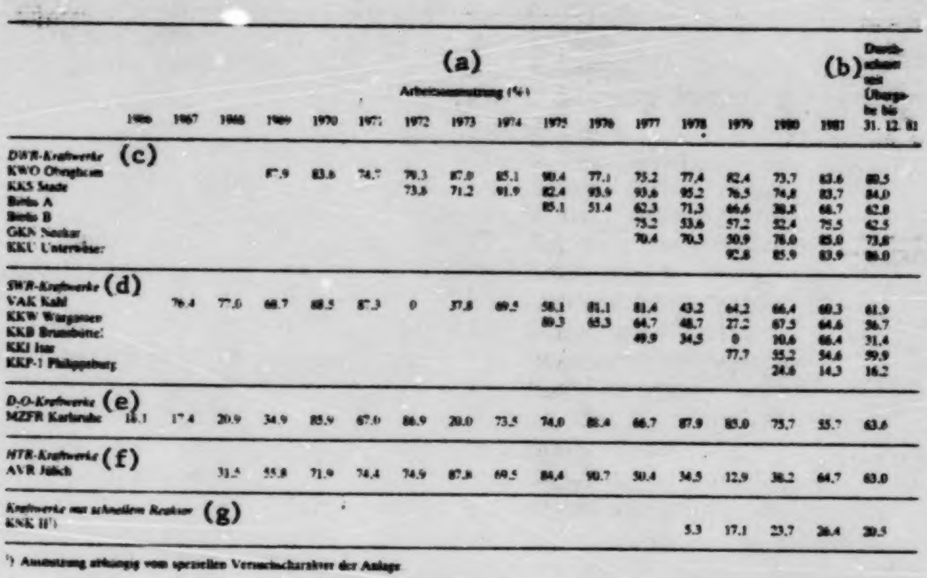
	(a) Zeitverfügbarkeit (%)																			(b) Durchschnitt seit Übergabe bis 31. 12. 81
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	
DWR-Kraftwerke (c)																				
KWO Obrigheim							86.8	83.9	76.4	80.1	89.9	92.1	91.5	79.8	77.0	78.4	85.8	76.2	87.3	83.7
KKS Stade										75.4	73.1	91.9	84.8	94.5	94.1	95.1	77.3	76.7	84.8	85.1
Biblis A													87.8	52.6	67.3	74.6	85.7	48.9	71.8	68.9
GKN Neckar															74.4	75.2	53.6	80.6	88.0	75.3
Biblis B															86.0	66.7	82.8	65.6	77.7	75.9
KKU Unterweser																		89.1	86.8	88.7
SWR-Kraftwerke (d)																				
VAK Kahl¹)	42.8	71.0	87.6	73.6	69.3	87.0	85.1	91.3	86.2	0	37.0	67.8	52.7	75.2	74.7	52.7	78.7	76.8	75.5	62.2
KWW Würgassen													89.3	82.8	81.1	62.3	35.8	94.8	84.2	73.8
KKB Brunsbüttel															51.7	30.9	0	32.2	84.9	37.5
KKI Isar																		65.9	67.1	70.7
KKP-1 Philippsburg																		27.3	17.0	19.4
D₂O-Kraftwerke (e)																				
MZFR Karlsruhe						36.1	40.6	85.6	66.8	85.5	19.8	73.1	73.6	86.9	66.0	89.8	88.4	76.0	59.3	64.7
HTR-Kraftwerke (f)																				
AVR Jülich						51.4	71.7	84.5	78.6	76.8	89.8	70.8	87.6	91.9	57.7	35.4	28.8	44.3	67.4	68.5
Kraftwerke mit schnellem Reaktor (g)																				
KNK II²)																19.1	22.4	29.7	40.2	30.2

¹) Zeitverfügbarkeit im Jahr 1961: 58.9%; 1962: 74.9%.
²) Verfügbarkeit abhängig vom speziellen Versuchscharakter der Anlage.

Key:
a. Time availability (percent)
b. Average from commission until 31 December 1981
c. DWR power plants
d. SWR power plants
e. D2O power plants
f. HTR power plants
g. Power plants with fast reactor

1) Time availability in 1961: 58.9 percent; 1962: 74.9 percent
2) Availability depends on the special experimental character of the installation

Operational Utilization of Nuclear Power Plants in the Federal Republic of Germany Until 31 December 1981



	(a) Arbeitsausnutzung (%)																(b) Durchschnitt seit Übergabe bis
	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	31. 12. 81
DWR-Kraftwerke (c)																	
KWO Obrigheim				87.9	83.6	74.7	79.3	87.0	85.1	90.4	77.1	75.2	77.4	82.4	73.7	63.6	80.5
KKS Stade							73.8	71.2	91.9	82.4	93.9	93.6	95.2	76.5	74.8	83.7	84.0
Biblis A										85.1	51.4	62.3	71.3	66.6	38.8	68.7	62.8
Biblis B												75.2	53.6	57.2	52.4	75.5	62.5
GKN Neckar												70.4	70.3	50.9	78.0	85.0	73.8
KKU Unterweser														92.8	85.9	83.9	86.0
SWR-Kraftwerke (d)																	
VAK Kahl		76.4	77.0	68.7	88.5	87.3	0	37.8	69.5	58.1	81.1	81.4	43.2	64.2	66.4	60.3	61.9
KKW Würgassen										89.3	65.3	64.7	48.7	27.2	67.5	64.6	56.7
KKB Brunsbüttel												49.9	34.5	0	10.6	66.4	31.4
KKI Isar														77.7	55.2	54.6	59.9
KKP-1 Philippsburg															24.6	14.3	16.2
D₂O-Kraftwerke (e)																	
MZFR Karlsruhe	16.1	17.4	20.9	34.9	85.9	67.0	86.9	20.0	73.5	74.0	86.4	66.7	87.9	85.0	75.7	55.7	63.6
HTR-Kraftwerke (f)																	
AVR Jülich			31.5	55.8	71.9	74.4	74.9	87.8	69.5	84.4	90.7	50.4	34.5	12.9	38.2	64.7	63.0
Kraftwerke mit schnellem Reaktor (g)																	
KNK II¹)													5.3	17.1	23.7	26.4	20.5

¹) Ausnutzung abhängig vom speziellen Versuchscharakter der Anlage

Key:
a. Operational utilization (percent)
b. Average from commission until 31 December 1981
c. DWR power plants
d. SWR power plants
e. D_2O power plants
g. Power plants with fast reactor

1) Utilization depends on the special experimental character of the installation.

Part II of the ATW Report concerning new nuclear power plants in Europe will follow in the June issue (Number 6/82). It contains a comprehensive European survey as well as individual reports concerning the situation in another 25 countries of western and eastern Europe.

In 1981, GKN achieved the highest load fact with 0.85, followed by KKU, KWO, and KKS each with 0.84, Biblis B with 0.75, and Biblis A with 0.69, as can be seen from the table of operational utilization.

As regards time availability (see table), GKN with 88 percent occupied the top spot, followed by KKU and KWO with 87 percent, KKS and KKB with 85 percent, and KWW with 84 percent.

The total cumulative gross generation of all nuclear power plants in the Federal Republic of Germany since their respective start-up until 31 December 1981 was 318,147 GWh[2].

In Start-up

Grafenrheinfeld KKG, 1300 MW, DWR

After the first hot-test operation in November 1980, during which the primary loop was heated by means of the cooling pumps and the pressurizer was heated to 290°C, and was brought to an overpressure of 157 bar, the results of the tests run during this hot-test operation were analyzed and were evaluated with the TUV (Technical Monitoring Association). This evaluation yielded a series of reequipment and improvement measures, which were completely approximately by the end of March 1981. The further start-up process followed these activities. With the issuance of the charging permit on 26 June 1981 by the Bavarian Environmental Industry, the last precondition for inserting the 193 fuel elements into the reactor was fulfilled. After the reactor pressure vessel was closed, the second hot-test operation could then be started on 7 July 1981 by heating up the pressure vessel. The second hot-test operation is the most comprehensive test program for the total installation and represents the conclusion of conventional start-up. Besides copious tests on the primary loop and the auxiliary reactor systems, the water and steam systems and the turbo set are here being tested.

After conclusion and evaluation of the results of the second hot-test operation, operating approval was granted by the Bavarian State Ministry for Provincial Development and Environmental questions, on 10 November 1981. This fulfilled the precondition for initiating the first criticality, which was reached on 9 December 1981 at 21:11 o'clock. The subsequent zero-load phase led into the 5 percent power phase, which was started on 18 December 1981 and which was completed on 22 December 1981 with the synchronization of the generator, connected with a first power delivery into the 400 kV network.

During the Christmas holidays, the installation remained subcritically hot. From this condition, on 28 December 1981, the 30 percent power stage was achieved. From 31 December 1981 until 3 January 1982 it was interrupted, according to plan, but was continued on 4 January 1982. At times, a power of 180 MW could be delivered into the network during this period. Then followed the start-up stage to 50 percent rated power. The next power stage of 80 percent was begun on 1 March 1982. Operation with full power is to be achieved by the end of May 1982, the beginning of trial operation. The expected commissioning date will be the end of June 1982.

Owner and Operator: Bayernwerk AG.
Supplier Company: KWU; Reactor Manufacturer: KWU (Kraftwerk Union AG)
Data: 1299 MWe gross, 1225 MWe net, 3765 MWth; pressurized water reactor
Location: Grafenrheinfeld/Main, Landkreis Schweinfurt.
Contract Issued: 20 January 1975.
Permits: First TEG requested 7 June 1973, issued 21 June 1974,
first partial building approval 18 December 1974;
beginning of construction: January 1975
Start-up: First criticality 9 December 1981;
first power generation 22 December 1981;
commercial operation expected by mid 1982

New Nuclear Power Plants in the Federal Republic of Germany -

(a) Lfd. Nr.	(b) Bezeichnung	(c) Bauherr bzw. Betreiber	(d) Standort	(e) Elektr. Leistung MW (f) brutto	netto (g)	(h) Reaktorleistung MWth	(i) Reaktortyp
1	KKK Krümmel	KKK GmbH (HEW 50%, NWK 50%)	Krümmel/Geesthacht (Elbe)	1 316	1 260	3 690	Siedewasser (j)
2	Mülheim-Kärlich	RWE	Mülheim-Kärlich (Rhein)	1 308	1 223	3 760	Druckwasser (k)
3	KWG Grohnde	Gemeinschaftskernkraftwerk Grohnde GmbH (Preußenelektra 50%, Gemeinschaftskraftwerk Weser 50%)	Grohnde (Weser)	1 361	1 294	3 765	Druckwasser (k)
4	KRB II-B Gundremmingen	KGV bzw. KGB (RWE 75%, Bayernwerk 25%)	Gundremmingen (Donau)	1 310	1 244	3 840	Siedewasser SWR 72 (j)
5	KRB II-C Gundremmingen	KGV bzw. KGB (RWE 75%, Bayernwerk 25%)	Gundremmingen (Donau)	1 310	1 244	3 840	Siedewasser SWR 72 (j)
6	KBR Brokdorf	Kernkraftwerk Brokdorf GmbH (NWK 50%, HEW 50%)	Brokdorf (Elbe)	1 365	1 290	3 765	Druckwasser (k)
7	KKP-2 Philippsburg	KKP GmbH (Badenwerk 50%, EVS 50%)	Philippsburg/Rheinschanzinsel (Rhein)	1 362	1 281	3 765	Druckwasser (k)
8	KWS-1 Wyhl	KWS GmbH (Badenwerk 50%, EVS 50%)	Wyhl (Rhein)	1 362	1 284	3 765	Druckwasser (k)
9	Uentrop THTR-300¹)	HKG (GKW Weser 26%, Komm. E-Werk Mark 26%, VEW 26%, GWH 12%, Stadtwerke Aachen 5%, Stadtwerke Bremen 5%)	Uentrop-Schmehausen (Kreis Unna)	308	296	760	Gasgek. Kugelhaufen-Hochtemperatur (l)
10	Kalkar SNR-300²)	SBK (RWE 68,8%, SEP [NL] 14,8%, Electronucléaire [Belg.] 14,8%, CEGB [GB] 1,6%)	Kalkar, Kreis Kleve (Rhein)	327	295	762	Na-gekühlter Schneller Brüter (m)
11	KKH Hamm	KLE GmbH (VEW 74%, Elektromark 26%)	Hamm-Uentrop	1 301	1 231	3 765	Druckwasser (k)
12	KKE Emsland	KLE GmbH (VEW 74%, Elektromark 26%)	Lingen (Ems)	1 301	1 231	3 765	Druckwasser (k)
13	Biblis C	RWE	Biblis (Rhein)	1 314	1 237	3 765	Druckwasser (k)
14	KKI-2 Isar	Bayernwerk (40%), Isar-Amperwerke (25%), Stadtwerke München (25%), OBAG (10%)	Ohu (Isar)	1 350	1 270	3 765	Druckwasser (k)
15	GKN-2 Neckar	GKN GmbH (Neckarwerke 45%, TWS 32%, Bundesbahn 20%, Zementwerk/Elektrizitätswerk Lauffen AG 3%)	Neckarwestheim/Gemmrigheim (Neckar)	1 301	1 230	3 765	Druckwasser (k)
16	Neupotz A	RWE - PW GbR (RWE 74%, Pfalzwerke 26%)	Neupotz (Rhein)	1 374	1 285	3 760	Druckwasser (k)
17	Vahnum-A und -B	RWE	Vahnum (Niederrhein)	2·1300	2·1226	2·3765	Druckwasser (k)
18	KRL Pfaffenhofen A	Kernkraftwerk RWE-LEW (KRL) (RWE 75%, LEW 25%)	Pfaffenhofen an der Zusam	1 348	1 289	. . .	Druckwasser (k)
19	KWB Borken	Preußenelektra	Borken/Bez. Kassel	1 300	1 240	. . .	Druckwasser (k)
2	SNR-2	ESK (SBK 51%, ENEL 33%, EDF 16%)	Kalkar (Referenz)	1 460	1 300	3 400	Na-gekühlter Schnellbrüter (m)

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1) Übergabe an den Betreiber

2) Prototypkernkraftwerk mit überwiegender Finanzierung durch die öffentliche Hand

3) Bauarbeiten durch Gerichtsbeschluß vom 20. 10. 77 bis Frühjahr 1979 unterbrochen

4) Nach dem am 17. 12. 76 verhängten Baustopp waren die Arbeiten bis 6. 2. 81 unterbrochen

5) Bauarbeiten unterbrochen seit 19. 2. 75 wegen Bauplatzbesetzung durch Kernkraftwerksgegner und Gerichtsbeschluß vom 14. 3. 75

6) Abhängig vom Ablauf des Genehmigungsverfahrens

7) Wegen der langen Verzögerung des Genehmigungsverfahrens wurde die Planung einer 855-MWe-Anlage auf eine 1300-MWe-Anlage umgestellt

8) Der Deutsche Bundestag beschloß am 14. 12. 78 einen politischen Genehmigungsvorbehalt für die Inbetriebnahme des SNR-300, über den noch nicht entschieden wurde

9) Der Bauherr vereinbarte mit der Lieferfirma, daß der 1975 erteilte Auftrag für jenes der beiden Projekte KKH oder KKE gelten soll, das als erstes eine vollziehbare 1. TEG erhält. Das jeweils andere Projekt soll voraussichtlich 2 Jahre später folgen

Abkürzungen:

BBC	Brown, Boveri & Cie AG
BBR	Brown Boveri Reaktor GmbH
CEGB	Central Electricity Generating Board
EDF	Electricité de France
ESK	Europäische Schnell-Brüter-Kernkraftwerksgesellschaft mbH
EVS	Energie-Versorgung Schwaben AG
GKN	Gemeinschaftskernkraftwerk Neckar GmbH

(Key on following page)

Key:
a. Running number
b. Designation
c. Owner or operator
d. Location
e. Electrical power MW
f. Gross
g. Net
h. Reactor power MWth
i. Reactor type
j. Boiling water
k. Pressurized water
l. Gas cooled pebble bed high temperature
m. Na-cooled fast breeder

1) Transfer to the operator.
2) Prototype nuclear power plant with main financing from government agencies.
3) Construction work interrupted by legal decision from 20 October 1977 throuth the spring of 1979.
4) After the construction stop imposed on 17 December 1976, work was interrupted until 6 February 1981.
5) Construction work interrupted since 19 February 1975 because of site occupation by opponents of nuclear power plants and because of illegal decision of 14 March 1976.
6) Depends on the course of the approval procedure.
7) Because of the long delay of the approval procedure, the planning of an 855 MWe installation was changed to a 1300 MWe installation.
8) The German Parliament, on 14 December 1978, decided on a political approval reservation for the start-up of the SNR-300, concerning which a decision has not yet been made.
9) The owner agreed with the supplier corporation that the contract issued in 1975 should apply to that one of the two projects KKH or KKE, which first receives an executable first TEG. The other project should then presumably follow 2 years later.

Abbreviations:

BBC	Brown, Boveri & Cie AG
BBR	Brown Boveri Reaktor GmbH
CEGB	Central Electricity Generating Board
EDF	Electricite de France
ESK	European Fast Breeder Nuclear Power Plants Ltd.
EVS	Energy Utility Company, Schwabia AG
GKN	Communicty Power Plant of Neckar Ltd.

Under Construction and Being Planned (Status: March 1982)

	Stand des Projekts (n)	(o)	Auftragsvergabe (voraussichtlich)	(p) Gesamtanlage	(q) Lieferfirma Reaktor	Baubeginn (voraussichtlich) (r)	Geplante Inbetriebnahme¹) (s) zur Zeit (t)	bei Auftragsvergabe (u)
(v) (w)	In Bau 1. TEG 18. 12. 73, Baugenehmigung 7. 6. 74		17. 7. 72	KWU	KWU	Januar 1974	August 1983	(1978)
(v)	In Bau 1. TEG 14. 1. 75		9. 1. 73	Konsortium BBC/BBR/Hochtief	BBR	16. 1. 75	Ende 1985	(1978)
(v) (x)	In Bau 1. TEG 9. 6. 76, Bauarbeiten ab 20. 10. 77 durch Gerichtsbeschluß bis März 1979 unterbrochen		19. 6. 75	KWU	KWU	Juni 1976²)	1985	(1979)
(v)	In Bau 1. TEG 16. 7. 76		14. 5. 75	KWU/Hochtief	KWU	21. 7. 76	(nn) Mitte 1984	(1979)
(y)	In Bau 1. TEG 16. 7. 76		14. 5. 75	KWU/Hochtief	KWU	21. 7. 76	Anfang 1985	(1980)
(v) (y)	In Bau 1. TEG 25. 10. 76, Bauarbeiten vom 17. 12. 76 bis 6. 2. 81 durch Gerichtsbeschluß unterbrochen		19. 6. 75	KWU	KWU	26. 10. 76²)	(oo) 1986/87	(1980/81)
(v)	In Bau 1. TEG 6. 7. 77		27. 6. 75	KWU	KWU	7. 7. 77	1985	(1981)
(v) (z)	In Bau 1. TEG 22. 1. 75, Bauarbeiten durch Baustellenbesetzung und Gerichtsbeschluß seit 19. 2. 75 unterbrochen		27. 6. 75	KWU	KWU	17. 2. 75³)	*	(1979)
(v)	In Bau 1. TEG Mai 1971		Oktober 1971 (kk)	Konsortium THTR (BBC, HRB, NUKEM)	HRB	Mai 1971	(pp Herbst 1984	(1975/76)
(v)	In Bau 1. TEG 18. 12. 72		10. 11. 72	(11) INB Internationale Natrium-Brutreaktor-Baugesellschaft mbH., Bau-Arge KKW Kalkar	INTERATOM	24. 4. 73	1986⁴)	(1978/79)
(aa)	Auftrag erteilt, 1. TEG beantragt 22. 6. 75, erneut beantragt wegen Planungsänderungen 5. 8. 81		23. 6. 75⁵)	KWU	KWU	*	⁵)	(1981)
(bb)	1. TEG beantragt 17. 4. 78, erneut beantragt nach Planungsänderung 28. 11. 80; Planungsauftrag erteilt		(1982)⁶)	(mm) (Genehmigungsantrag auf Basis KWU-Druckwasser-KW)	KWU	1982	1988⁶)	. . .
(cc)	Auftrag erteilt, 1. TEG beantragt 18. 4. 75, erneut beantragt wegen Planungsänderungen 10. 10. 80		24. 6. 75	KWU/Hochtief	KWU	(1982/83)⁶)	1989/90⁶)	(1981)
(dd)	Raumordnungsverfahren abgeschlossen Dez. 1979, Letter of Intent erteilt 30. 1. 80, 1. TEG beantragt 13. 2. 79		(1982)	KWU	KWU	(1982)	1988	. .
(ee)	Planungsauftrag erteilt, 1. TEG beantragt 23. 6. 75, erneut beantragt wegen Planungsänderung am 27. 11. 80		*	KWU⁷)	KWU	(1982/83)	1989/90	(1981)
(ff)	Letter of Intent 30. 4. 77, Auftrag erteilt, 1. TEG beantragt 16. 6. 77		27. 11. 78	Konsortium BBC/BBR, Hochtief	BBR	1984⁸)	1991⁸)	(1984/85)
(gg)	Angebote eingegangen Anfang 1975, Standortvorbescheid beantragt 23. 11. 78, 1. TEG beantragt 29. 11. 74		*	KWU/Hochtief	KWU	⁹)	A: ⁹) B: ⁹)	.
(hh)	Trägergesellschaft KRL im Okt. 1975 gegründet, Raumordnungsverfahren abgeschlossen 5. 10. 81		*	*	*	1984⁹)	1990⁹)	
(ii)	Errichtungsgenehmigung beantragt 11. 9. 74		*	*	*	*	*	
(jj)	Vorplanung		*	INB	INTERATOM/Belgonucléaire/Neratoom/KWU	*	*	

HEW	Hamburgische Electricitäts-Werke AG
HKG	Hochtemperatur-Kernkraftwerk GmbH
HRB	Hochtemperatur-Reaktorbau GmbH
INB	Internationale Natrium-Brutreaktor-Baugesellschaft mbH
KBG	Kernkraftwerk-Betriebsgesellschaft mbH
KBR	Kernkraftwerk Brokdorf GmbH
KGB	Kernkraftwerke Gundremmingen Betriebs-GmbH
KGV	Kernkraftwerke Gundremmingen Verwaltungs-GmbH
KKB	Kernkraftwerk Brunsbüttel GmbH
KKE	Kernkraftwerk Emsland
KKH	Kernkraftwerk Hamm
KKI	Kernkraftwerk Isar GmbH
KKK	Kernkraftwerk Krümmel GmbH
KKP	Kernkraftwerk Philippsburg GmbH
KLE	Kernkraftwerke Lippe-Ems GmbH
KRB	Kernkraftwerk RWE-Bayernwerk GmbH
KRL	Kernkraftwerk RWE-LEW
KWG	Gemeinschaftskernkraftwerk Grohnde GmbH
KWS	Kernkraftwerk Süd GmbH
KWU	Kraftwerk Union AG
LEW	Lech-Elektrizitätswerke AG
NWK	Nordwestdeutsche Kraftwerke AG
OBAG	Energieversorgung Ostbayern AG
PW	Pfalzwerke AG
RWE	Rheinisch-Westfälisches Elektrizitätswerk AG
RWE-PWGbR	RWE-PW Gesellschaft des bürgerlichen Rechts
SBK	Schnell-Brüter-Kernkraftwerksgesellschaft mbH
SEP	Samenwerkende Electriciteits Productiebedrijven
SNR	schneller Natriumgekühlter Reaktor
TEG	Teilerrichtungsgenehmigung
THTR	Thorium-Hochtemperatur-Reaktor
TWS	Technische Werke der Stadt Stuttgart AG
VEW	Vereinigte Elektrizitätswerke Westfalen AG

(Key on following page)

Key:
n. Status of the project
o. Letting of the contract (expected)
p. Total system
q. Supplier firm, reactor
r. Beginning of construction (expected)
s. Planned start-up[1]
t. At the present
u. Upon letting of the contract
v. Under construction
w. First TEG 18 December 73, building approval 7 June 74
x. First TEG 8 June 76, construction work interrupted by legal decision from 20 October 77 through March 1979
y. First TEG 25 October 76, construction work interrupted by legal decision from 17 December 76 through 6 February 81
z. First TEG 22 January 75, construction work interrupted by building site occupation and legal decision since 19 February 75
aa. Contract granted, first TEG applied for on 23 June 75, applied for again because of plan changes on 5 August 81
bb. First TEG applied for on 17 August 78, applied for again after planning changes on 28 November 80, planning contract granted
cc. Contract granted, first TEG applied for on 18 April 75, applied for again because of planning changes on 10 October 1980
dd. Space arrangement procedures concluded December 1979, Letter of Intent issued on 30 January 1980, first TEG applied for on 13 February 79
ee. Planning contract granted, first TEG applied for on 23 June 75, applied for again because of planning changes on 27 November 1980
ff. Letter of Intent on 30 April 77, contract granted, first TEG applied for on 16 June 77
gg. Offers received beginning 1975, site decision requested 23 November 78, first TEG applied for 29 November 74
hh. Carrier corporation KRL founded in October 1975, space arrangement procedures concluded on 8 October 81
ii. Construction permit requested on 11 September 74
jj. Preliminary planning
kk. October 1971
ll. INB Internation Breeder Reactor Construction Company Ltd, Bau-Arge KKW Kalkar
mm.(Approval application on the basis of KWU pressurized water KW)
nn. Middle of 1984
oo. Beginning of 1985
pp. Fall of 1984

HEW	Hamburgische Electricitats-Werke AG (Hamburg Electrical Works Inc.)
HKG	Hochtemperatur-Kernkraftwerk GmbH (High Temperature Nuclear Power Plant Ltd.)
HRB	Hochtemperatur-Reaktorbau GmbH (High Temperature Reactor Construction Ltd.)
INB	Internationale Natrium-Brutreaktor-Baugesellschaft mbH (International Sodium Breeder Reactor Construction Company Ltd.)
KBG	Kernkraftwerk-Betriebsgesellschaft mbH (Nuclear Power Plant Operating Company, Ltd.

KBR	Kernkraftwerk Brokdorf GmbH (Brokdorf Nuclear Power Plant, Ltd.)
KGB	Kernkraftwerke Gundremmingen Betriebs-GmbH (Gundremmingen Nuclear Power Plant Operating Company, Ltd.)
KGV	Kernkraftwerke Gundremmingen Verwaltungs GmbH (Gundremmingen Nuclear Power Plant Management Company, Ltd.)
KKB	Kernkraftwerk Brunsbüttel GmbH (Brunsbüttel Nuclear Power Plant Ltd.)
KKE	Kernkraftwerk Emsland (Emsland Nuclear Power Plant)
KKH	Kernkraftwerk Hamm (Hamm Nuclear Power Plant)
KKI	Kernkraftwerk Isar GmbH (Isar Nuclear Power Plant, Ltd.)
KKP	Kernkraftwerk Philippsburg GmbH (Philippsburg Nuclear Power Plant, Ltd.)
KLE	Kernkraftwerke Lippe-Ems GmbH (Lippe-Ems Nuclear Power Plant, Ltd.)
KRB	Kernkraftwerk RWE-Bayernwerk GmbH (RWE Bavarian Work Nuclear Power Plant, Ltd.)
KRL	Kernkraftwerk RWE-LEW (RWE-LEW Nuclear Power Plant)
KWG	Gemeinschaftskernkraftwerk Grohnde GmbH (Grohnde Community Nuclear Power Plant, Ltd.)
KWS	Kernkraftwerk Süd GmbH (South Nuclear Power Plant, Ltd.)
KWU	Kraftwerk Union AG (Union Power Plant, Inc.)
LEW	Lech-Electrizitätswerke AG (Lech Electrical Works, Inc.)
NWK	Nordwestdeutsche Kraftwerke AG (Northwest German Power Plants, Inc.)
OBAG	Energieversorgung Ostbayern AG (Eastern Bavarian Energy Utility, Inc.)
PW	Pfalzwerke AG (Pfalz Works Inc.)
RWE	Rheinisch-Westfalisches Elektrizitaswerk AG (Rhenish-Westphalia Electrical Works, Inc.)
RWE-PWGbR	RWE-PW Gesellschaft des bürgerlichen Rechts (RWE-PW Corporation of the Public Law
SBK	Schnell-Brüter-Kernkraftwerksgesellschaft mbH (Fast Breeder Nuclear Power Plant Company, Ltd.)
SEP	Samenwerkende Electriciteits Productiebedrijven
SNR	Schneller Natriumgekühlter Reaktor (Fast Sodium-Cooled Reactor)
TEG	Teilerrichtungsgenehmigung (Partial Approval Permit)
THTR	Thorium-Hochtemperatur-Reaktor (Thorium High Temperature Reactor)
TWS	Technische Werke der Stadt Stuttgart AG (Technical Works of the City of Stuttgart Inc.)
VEW	Vereinigte Elektrizitatswerke Westfalen AG (United Electrical Works of Westphalia Inc.)

2. Nuclear Power Plants Under Construction

Krümmel KKK 1300 MW SWR

The course of the approval procedure for the Krümmel Nuclear Power Plant (KKK) was a satisfactory one in 1981. At no time was work at the construction site hindered by the lack of approvals or assembly permits.

The 12th partial permit (TEG) was granted on 20 January 1981 - it essentially comprises clear safety changes such as the construction of an external monitoring system, of a reactor building gate that is safe against air crashes, and a second cooling water pumping house with an associated intake structure. This once again clearly increased the activity on the construction site. An important key date could be reached with the flushing of the nuclear auxiliary systems. Test runs on a series of systems were connected with the flushing program. The second integral pressure test of the pressure vessel and the connecting pipeline within the containment could be performed on 12 July 1981 just as successfully as the reactor well and drier and separator storage pool long-term tests. The comprehensive program of quality-improving measures (among other things, selected round seams were polished by means of an interior tube grinding machine) were concluded. The cold test that was originally planned for the middle of December 1981 had to be postponed by 4 months, among other reasons, because of problems with "pipeline supports", so that the transfer date will be delayed until August 1983.

The 13th TEG was requested on 6 August 1981 and was granted on 20 January 1982. It primarily concerned system safety, diesels 3 and 4, E and M engineering, the second cooling water pumping house, activity instrumentation, and fuel element handling.

Besides the construction activity, there took place preliminary operating tests, pressure tests, partial and total start-ups of individual systems.

The 14th TEG essentially concerns safety systems, the reactor pressure vessel built-ins/Part 2, nuclear components including fuel elements, and operation of the system. In October 1981, a public process was initiated for this TEG, for which the updated safety report for the total system was presented. The presentation within the framework of the public process was concluded on 28 December 1981; approximately 6,100 objections were received.

Owner and Operator: Kernkraftwerk Krümmel GmbH (HEW 50 percent, NWK 50 percent).
Management: HEW.
Supplier Company: KWU; Reactor Manufacturer: KWU.
Data: 1316 MWe gross, 1260 MWe net, 3690 MWth; boiling water reactor.
Location: Krümmel/Elbe at Geesthacht.
Granting of Contract: Letter of Intent 31 January 1972; Contract: 17 July 1972.
Approval: First TEG 18 December 1973; beginning of construction 2 January 1974.
Start-up: August 1983.

A detailed description of the system together with technical data can be found in ATW 20, pp 66-73 (February 1975).

Mülheim-Kärlich 1300 MW DWR

Building and assembly work was continued in 1981 at the Nuclear Power Plant Mülheim-Kärlich. All the rough construction work has practically been concluded, with the exception of the janitor and garage building with the integrated information center, which will be completed in 1982. The pressure test of the containment was successfully performed in the summer of 1981.

Upon receipt of the fifth TEG in June 1981, a beginning could be made with the assembly of the primary loop. This will be completed in the spring of 1982.

Inasmuch as construction permits exist, the assembly of the components and systems is being continued as much as possible. The turbo set is almost completely installed.

A construction permit is still necessary for the final completion of the system. This concerns mainly the auxiliary reactor systems and secondary systems as well as reactor protection, as well as a fuel element handling permit. A trial run and operating permit must follow.

On the basis of plan changes with respect to the safety report of 1973, a second explanation date took place in February 1981. Thereupon, the approval agency granted a second TEG (second decision) by means of which the changes were approved.

Start-up is planned for the end of 1985.

Owner: RWE.
Deliverying Firm: Konsortium BBC/Brown Boveri Reaktor GmbH (BBR); reactor manufacturer: BBR.
Data: 1308 MWe gross, 1223 MWe net, 3760 MWth; pressurized water reactor.
Location: Mülheim-Kärlich/Rhein at Koblenz.
Granting of the Contract: Letter of Intent 23 October 1972, Contract 9 January 1973.
Approval: First TEG applied for 22 December 1972, issued 14 January 1975; beginning of construction: 16 January 1975.
Start-up: End of 1985.

A detailed description of the installation together with technical data can be found in atw 20, pp 245-250 (May 1975).

Grohnde KWG 1350 MW DWR

The Social Minister of Lower Saxony, on 7 May 1981, granted the fourth partial construction approval (TEG) and on 23 December 1981 granted the fifth TEG to construct the Grohnde Nuclear Power Plant (KWG). Thus all the reactor auxiliary systems and secondary systems, electrical systems of control technology, and of measurement and regulation technology, the main lifting tools, as well as parts of the secondary system have been approved. The sixth TEG, which essentially comprises the assembly of the major components and of the primary loop, is expected in the spring of 1982. The district government of Hannover, on 16 June 1981, issued water rights to withdraw and reintroduce cooling water and to eliminate operating water into the Weser.

The construction crew was increased to 1500 workers, as a result of the activities that were initiated by the above steps. The rough construction work on all the buildings of the off-air chimney and the two 146 m high cooling towers are concluded except for the dome of the reactor building. The steel casing was closed by welding the pole sheet. In nearly all the building, pipeline assembly is the focal point of the work. The in-house switching systems are already being supplied through outside mains transformers. The water preparation system is just about ready to start up.

Start-up of the nuclear power plant is now planned for 1985.

Builder and Operator: Gemeinschaftskernkraftwerk Grohnde GmbH (Preussiche Elektrizitäts AG 50 percent, Gemeinschaftskraftwerk Weser GmbH 50 percent).
Delivering Firm: KWU; reactor manufacturer: KWU.
Data: 1361 MWe gross, 1294 MWe net, 3765 MWth; pressurized water reactor
Location: Emmerthal/Weser locality of Grohnde.
Granting of the Contract: Letter of Intent 8 February 1974
Contract 19 June 1975
Approval: First TEG requested 3 December 1973, granted 8 June 1976; beginning of construction: June 1976; construction interrupt by legal decision from 20 October 1977 until March 1979
Start-up: 1985

Gundremmingen KRB II B and C 2 · 1300 MW SWR

The first partial construction permit for the Nuclear Power Plant KRB II in Gundremmingen was granted on 19 July 1976 by the Bavarian State Minister for Provincial Development and Environmental Questions. The construction work was begun immediately thereafter on 20 July 1976.

With the fifth TEG, which was issued in November 1981, assembly of the machine and electrical systems has become possible but for a few exceptions. The rough construction of the main buildings is completed. The construction measures are running in parallel to machine and electrical assembly at a good rate.

In Block B, on 13 November 1981, a pressure test was successfully performed on the reactor pressure vessel. Besides the assembly of the reactor pressure vessel built-ins, assemblies and pressure tests were concluded on the machine systems, up to about 20 percent. The in-house requirements of Block B has been put into operation and is is under voltage. At this time, the cabling runs in the direction of process-technical loads. A beginning was made with electrical and guidance start-up. The turbo set of Block B is finished about 80 percent.

In Block C, the last welding seam of the reactor pressure vessel was final-annealed. The preparatory work for the pressure test, which is planned for the middle of 1982, is in progress. The internal switching of Block C is anticipated for June 1982. The capacitors of the turbo set are ready. A beginning was made with assembling the turbine and the generator.

Two further construction permits for the construction of the remaining auxiliary and secondary systems and for the compact storage of fuel elements are still expected in 1982. For the beginning of 1983, the fuel element handling permit will become necessary, and by the end of 1983 the operating permit.

As a consequence of the massive pipeline and component assembly as well as the start-ups, 3,000 persons are employed at the site.

The date for transfer of the Block B, if the permits are approved at the proper time, will be the middle of 1984 according to present perspectives.

For Block C, the assembly work is progressing in such a way that, with a delay of 8 months with respect to Block B, a transfer date at the beginning of 1984 is being hoped for.

Builder: Kernkraftwerke Gundremmingen Verwaltungsgesellschaft mbH (KGV)
Operator: Kernkraftwerke Gundremmingen Betriebsgesellschaft mbH (KGB) (RWE 75 percent, Bayernwerk 25 percent).
Deliverying Firm: Arge KWU/Hochtief; reactor manufacturer: KWU.
Data: 2 · 1310 MWe gross, 2 · 1244 MWe net, about 2 · 3840 MWth; boiling water reactor SWR-72.
Location: Gundremmingen/Donau, District of Günzburg.
Granting of the Contract: Letter of Intent 25 February 1974,
Contract 14 May 1975
Approval: First TEG requested 15 March 1974, granted 19 July 1976;
Beginning of construction: July 1976.
Start-up (Transfer): Block B middle of 1984, Block C beginning of 1985.

Brokdorf KBR 1350 MW DWR

The construction work for the Brokdorf Nuclear Power Plant (KBR) was begun on 26 October 1976, after the responsible ministries of the Province of Schleswig-Holstein, on 25 October 1976, issued the first partial construction approval (TEG) for the construction site equipment and for the foundation work of the reactor building. Because of a legal decision on 17 December 1976, work had to be stopped again. It could only be resumed on 6 February 1981. On 19 February 1981, the second TEG was issued, which comprises the rough construction of the reactor, auxiliary systems, and switching system buildings as well as the erection of the containment. On 26 February 1981, the first large pillar for the reactor foundation was set down.

From 23 June to 23 August 1981, a revised safety report was presented. On 8 January 1982, the third TEG was issued, which permits the completion of the construction work on the machine house, the cooling water building, and auxiliary buildings.

In the middle of October 1981, the pillar foundation work for the reactor-, auxiliary system-, and the switching system-buildings was completed. The work for enclosing the building excavations then began, the excavation and armoring of the piled head plate, which is the actual foundation of the reactor building. The pouring of the concrete for this took place in a concentrated continuous action of about 100 hours' duration, which was concluded on 8 February 1982.

The assembly of the spherical steel containment should be begun on this foundation by the middle of 1982. As soon as the weather allows after the end of the winter, the erection of parts of the high rise structures will be begun. These parts belong to the reactor building. The construction work associated with the second and third TEG should take about 3 years.

The fourth TEG for the erection of the machine and electrical equipment is expected by the owner around the turn of the year 1982/83.

The investment volume of the KBR, according to the present cost status, is about 3 billion DM. Of this, about 550 million DM pertain to the construction part, and of this again 150 million DM has already been assigned for the rough construction work. The assignment of the remaining work of the construction part is in view by the end of 1982. Altogether, contracts in excess of 600 million DM were granted besides the rough construction, essentially for machine and electrical components with a long delivery time.

The number of employees at the construction site was about 600 by the end of 1981. It then was temporarily reduced to about 500, but will exceed 1,000 by the middle of 1982.

With rapid progress of the work, and of the approvals, start-up of the KBR is expected for 1986/87.

Builder and Operator: Kernkraftwerk Brokdorf GmbH (KBR) (NWK 50 percent, HEW 50 percent).
Delivering Firm: KWU; reactor manufacturer: KWU.
Data: 1365 MWe gross, 1290 MWe net, 3776 MWth; pressurized water reactor.
Location: Brokdorf/Elbe.
Granting of the Contract: 19 June 1975.
Approval: First TEG requested 12 March 1974, granted 25 October 1976; Beginning of construction 26 October 1976, interrupted by legal decision from 17 December 1976 to 6 February 1981.
Start-up: 1986/87.

Philippsburg KKP-2 1350 MW DWR

The responsible approval agency of the Province of Baden-Württemberg, on 26 August 1981, issued the fifth partial erection permit (TEG) for the Philippsburg Nuclear Power Plant Block 2 (KKP-2). It also allowed various supplements to previously granted permits. What was approved was essentially the total electrical and guidance technology and the nuclear and conventional auxiliary systems, except for the after-heat dissipation systems.

The rough construction work on the block buildings has been essentially concluded. The finishing building work and the ventilation channel assembly in the reactor auxiliary systems building, the machine house, and the switching systems building was continued.

The reactor building is finished in rough construction to such an extent that the rotary crane could be brought in. The assembly of the reactor containment is almost completed. A beginning has been made with construction work on the fittings chamber.

In the machine house, assembly of the components and pipelines could be begun. The feed water container has been welded. In the switching systems building, erection of the switching systems and assembly of the cable construction has been begun.

Builder and Operator: Kernkraftwerk Philippsburg GmbH (KKP) (Badenwerk 50 percent, EVS 50 percent).
Delivering Firm: KWU; Reactor manufacturer: KWU.
Data: 1362 MWe gross, 1281 MWe net, 3765 Mwth; pressurized water reactor.
Location: Philippsburg/Rhein(Rheinschanzinsel).
Granting of the Contract: 17 June 1975
Approval: First TEG granted 6 July 1977
Beginning of construction: 7 July, 1977
Start-up: 1985.

WYHL KWS-1 1350 MW DWR

The construction for the South Nuclear Power Plant at Wyhl (KWS) could not yet be resumed in 1981, since the appelate process before the 10th Senate of the Superior Court of Baden-Württemberg (VGH) in Mannheim could not be concluded. This legal process concerns the building stop ordered by the first instance, the District Court of Freiburg, on account of the lack of bursting protection. In November 1981, the pleadings were completed. Before this, in September 1981, the presentation of evidence was concluded on two dates, in the area of reactor safety and radioecology. A judgment is expected in the spring of 1982.

The contract of June 1975, to the Kraftwerk Union AG (KWU), concerning delivery of the nuclear power plant, is quiescent at this time.

Builder: Kernkraftwerk Süd GmbH (KWS) (Badenwerk 50 percent, EVS 50 percent).
Delivering Firm: KWU; reactor manufacturer: KWU.
Data: 1362 MWe gross, 1284 MWe net, 3765 MWth; pressurized water reactor.
Location: Wyhl/Rhein.
Granting of the Contract: Letter of Intent April 1973, Contract 27 June 1975
Approval: First TEG requested 10 October 1973, granted 22 January 1975; Beginning of construction: 17 February 1975. Construction work interrupted since 23 February 1975 after occupation of the terrain by opponents of nuclear power plants and due to a legal decision of 14 March 1977.

Uentrop THTR-300 300 MW HTR

During the course of its erection time, the expected completion date of the THTR-300 Nuclear Power Plant in Hamm-Uentrop with helium-cooled thorium high-temperature reactor has often been delayed. The contractual erection time of the nuclear power plant, at the beginning of construction, and including start-up, was 61 months. This resulted in a date of 1 March 1977 for transfer to the operator. Because of the current delays, which essentially were based on the adaptation of the project to respectively the most recent state of science and technology, as well as on the prototype character of the power plant, and as a result of further delays in the approval procedure, a new correction of the schedule plan has become necessary. For 2 years, 1 151-month time plan - including start-up and trial operation - is now the basis for the construction. This implies a transfer date to the operator on 1 September 1984. The pressure test of the reinforced concrete container is planned for November 1982, the beginning of start-up for the second quarter of 1983. Important partial erection permits were issued in 1981, especially for the shutdown equipment with the supply system, the water-steam loop, and the auxiliary and secondary cooling water loops. These were required to continue the construction work.

On the machine side, the following building progress was achieved in 1981: Assembly of the six steam generators has been concluded, all shutdown equipment has been assembled (42 core rods and 36 reflector rods), work on the air guidance wall (preliminary assembly and assembly) has been 50 percent completed, the essential major components of the secondary loop are finished assembled, and assembly of the pipelines and water-steam loop has been begun. Assembly of the cooling water lines in the reactor hall is being continued according to plan. For the gas purification system, assembly of pipelines and valves is being implemented. In the charging system, a beginning has been made with laying the pipelines and with preparing the assembly for the dust collection vessel.

For the completion of the THTR, still further partial erection approvals will be required in 1982, which essentially comprise machine-engineering auxiliary systems, electrical and guidance systems. Furthermore, the first partial operating permit is required.

The previously outstanding legal complaint against the partial erection permit for the steam generator, cooling gas blower, and steam generator leakage control is currently not being treated further by the Arnsberg District Court, since the decision of the Münster Superior Court in the matter of the feed water container is still outstanding.

Because of the cost increases of the project and the budget difficulties of the Federal Government, problems in the financing of the THTR until its completion have arisen in 1981. However, up to now these have not had a significant effect on the progress of the work.

Owner: Hochtemperatur-Kernkraftwerk GmbH (HKG).
(A coalition of regional and communal electrical utility enterprises: Gemeinschaftskraftwerk Weser GmbH. Veltheim (26 percent); Kommunales Elektrizitätswerk Mark AG, Hagen (26 percent); Vereinigte Elektrizitatswerke Westfalen AG, Dortmund (26); Gemeinschaftswerk Hattingen GmbH, Hattingen (12 percent); Stadtwerke Aachen AG, Aachen (5 percent); Stadtwerke Bremen AG, Bremen (5 percent)).

Delivering Firm: Konsortium THTR (Brown, Boveri & Cie AG, secondary part; Hochtemperatur-Reaktorbau GmbH, primary part; NUKEM GmbH, fuel elements); reactor manufacturer: Hochtemperatur-Reaktorbau GmbH (HRB).
Data: 307.5 MWe gross, 296 MWe net, 768 MWth; with helium gas-cooled spherical pile thorium high temperature reactor.
Location: Uentrop-Schmehausen (District of Unna).
Granting of the Contract: Letter of Intent July 1970, contract 29 October 1971.
Approval: First TEG requested January 1970, granted May 1971;
Beginning of construction: May 1971, delivery time beginning 1 February 72.
Start-up: 1983/84

A detailed description of the installation together with technical data is given in ATW 16, pp 238-245 (May 1971).

Kalkar SNR-300 300 MW Fast Breeder

With the 300-MWe prototype Fast Breeder Nuclear Power Plant SNR-300 in Kalkar, the rough construction work, except for work on the cooling tower whose approval is expected in the spring of 1988, will essentially be completed in the next few months.

At this time, the technical auxiliary machine systems, which were approved in the first supplement to the third partial erection permit (TEG) in the middle of 1981, as well as the electrical and guidance system components are being mounted. Part of this work as well as the insertion of the double tank, which was approved simultaneously with the reactor cell built-ins, could be completed. Thus, on 6 October 1981, it was possible to switch in the in-house requirements from the high voltage network. The assembly of the system components for accident control and after-heat dissipation, which were approved with the fourth TEG, is in progress. A part thereof, such as the tertiary components in the steam generator housings, can be mounted only during the next year because, on the basis of more stringent requirements on the part of the experts and agencies, new finishing production and improvements had to be contracted for.

The issuance of the still outstanding seventh supplement to the second TEG, essentially for the steel casing, is expected shortly. The last expert opinions are being presented for the fifth TEG, which mainly comprises the systems of the nuclear power plant section, so that approval is expected for July 1982.

On the basis of the current approval status, start-up of the power plant in the year 1986 is possible. However, on 14 December 1978, Parliament decided on a political reservation of approval for the inception of operation. According to the report of the Enquete Commission "Future Nuclear Energy Policy", which is scheduled for 1982, Parliament will make a decision on this matter.

Furthermore, since the beginning of 1981, problems exist concerning financing the SNR-300 to its completion, as a consequence of cost escalations of the project to more than 5.4 billion DM and difficulties with the federal budget. The Federal Minister for Research and Technology (BMFT) requested an additional participation of the electrical utility enterprises in the amount of about 1.1 billion DM. The tedious negotiations up to now have resulted in conditional promises in the amount of 930 million DM; however, no definite decision has been reached. The new governments in Belgium and in the Netherlands have in principle indicated their readiness of increasing their higher contributions, from the already approved approximate 333 million DM each to about 470 million DM (which corresponds to the original participation rate in a total cost level of about 3.4 billion DM). The Federal Cabinet up to now has considered the SNR financing three times (on 23 September and 16 December 1981 and on 17 February 1982). In view of an impending building stop for lack of money, the BMFT, at the beginning of October 1981, granted a partial approval for 167 million DM to continue the work until the end of the year. In February 1982, the Federal Government approved an increase of its obligations in the amount of 500 million DM for further construction until about September 1982. However, of this 340 million DM must be requested as extra funds for the 1982 fiscal year.

The approval of the electric utilities as well as the effectiveness of interim financing depend on a positive decision concerning the SNR on the part of Parliamet after the summer recess. Again the on-time completion of the Enquete Commision report by 31 July 1982 is a precondition for this. The electrical utilities, in their negotiations, have also named the condition that the costs be passed on to the electrical consumers in a proportion that is uniformly distributed among all the participants.

Builder and Operator: Schnell-Brüter-Kernkraftwerksgesellschaft mbH (SBK) RWE (D) 68.85 percent, Electronucleaire (B) 14.75 percent, SEP (NL) 14.75 percent, CEGB (GB) 1.65 percent.
Delivering Firm: INB Internationale Natrium-Brütreaktor-Bau GmbH (INTERATOM (D) 70 percent, Belgonucleaire (B) 15 percent, Neratoom (N) 15 percent. Construction part: Arge Kernkraftwerk Kalkar (Hochtief AG AG (D), ASTROBEL General Contractors S.A. Anc. Auxeltra Genie Civil S.A., Compagnie d'Entreprises C.F.E. (B), Hollandsche Beton Maatschappij N.V. (NL)).
Data: 327 MWe gross, 295 MWe net, 762 MWth; sodium-cooled fast breeder.
Location: Kalkar/Rhein (District of Kleve).
Granting of the Contract: Letter of Intent 23 March 1972, Contract 10 November 1972.
Approval: First TEG granted 18 February 1972;
Beginning of construction: 24 April 1973.
Start-up: 1986 (pending Parliamentary approval)

Detailed description of the system with technical data in the ATW special issue on the SNR-300 (July 1972) and ATW 18, pp 411-414 (Aug./Sept. 1973).

3. Planned Nuclear Power Plants

HAMM KKH 1300 MW DWR

On 23 June 1975, the Kernkraftwerk Hamm GmbH (KKH) of that time, now called Kernkraftwerke Lippe-Ems GmbH (KLE), granted the contract for delivery of a 1300 MWe nuclear power plant with a pressurized water reactor to the Kraftwerk Union AG (KWU).

At the same time, the owner requested erection and operation of the system according to Paragraph 7 of the Atomic Law. Although the experts that had been appointed by the approval agency of the Province of North Rhine-Westphalia had already sometime before that given their opinions as regards the location and design, the first partial erection permit (TEG), which was expected by June 1976, has to date not been issued.

On 17 August 1978, the owner requested erection of the Nuclear Power Plant Block "Emsland" (KKE) near Lingen in Lower Saxony. After this, agreement was reached with the supplier firm to let that one of the contracts for the two projects KKH or KKE become effective which first receives an executable TEG. The other project should then presumably be put in operation two years later.

In November 1980, the approval agency of the Province of North Rhine-Westphalia for the first time indicated in writing that it would be ready to resume processing the approval application. Thereupon, a new approval application according to Paragraph 7 of the Atomic Law was presented with updated application documents in order to facilitate the dispatch of the procedures. This occurred on 5 August 1981. Since that time, according to the directives of the Atomic Law Process Ordinance, the approval agency has initiated the approval process and has appointed technical experts. Start-up of the KKH should occur about 70 months after beginning of construction.

Owner and Operator: Kernkraftwerke Lippe-Ems GmbH (KLE) (VEW 74 percent, Elektromark 26 percent).
Delivering Firm: KWU; reactor manufacturer: KWU
DATA: 1303 MWe gross, 1231 MWe net, 3675 MWth; pressurized water reactor
Location: VEW-Kraftwerk Westfalen in Hamm-Uentrop.
Granting of the Contract: 23 June 1975
Approval: First TEG requested 23 June 1975, new application because of plan changes on 5 August 1981.
Start-up: About 70 months after beginning of construction.

Emsland KKE 1300 MW DWR

On 17 August 1978, the Kernkraftwerke Lippe-Ems GmbH (KLE) together with the Kraftwerk Union AG (KWU) made application for the erection and operation of a 1300 MW nuclear power plant with a pressurized water reactor. The site is in in the immediate vicinity of the existing VEW operating terrain and within the area of the city of Lingen (Ems), Darme County, Emsland Province. The planned nuclear power plant in Emsland (KKE) is currently undergoing various steps of the approval process. The activities of the KWU are being furnished within the framework of a planning contract. However, already in 1978, the owner agreed with the KWU that the contract granted for the Hamm Nuclear Power Plant (KKH) should be applicable to that one of the two projects KKH or KKE which first receives an executable TEG. The other project should then presumably follow 2 years later.

After updating the application documents in the fall of 1980 within the framework of an alteration application and a renewed public presentation of the application documents in January and February 1981, the Atomic Law hearing date took place in May 1981.

In the meantime, the expert opinions that had been presented within the framework of the Atomic Law approval process could essentially be completed. The accompanying approval procedures also have progressed to such a point that fulfillment of the preconditions can be expected so as to begin construction in 1982. On 12 February 1982, the Federal Minister of the Interior gave his approval, as required by the Atomic Law, for granting the first TEG for KKE to the Lower Saxony Provincial Agency.

Start-up of the KKE should occur about 70 months after beginning of construction.

Owner and Operator: Kernkraftwerke Lippe-Ems GmbH (KLE) (VEW 74 percent,
Elektromark 26 percent).
Delivering Firm: KWU; reactor manufacturer: KWU
(as basis for the approval application)
Data: 1291 MWe gross, 1222 MWe net, 3675 MWth; pressurized water reactor
Location: Lingen/Ems.
Granting of the Contract:

Approval: First TEG applied for in August 1978; approval for water rights requesting in 1975, requested again after plan changes on 28 November 1980, energy-economic approval granted January 1980,
Beginning of construction: planned in 1982
Start-up: About 70 months after beginning of construction (1988?).

Biblis C 1300 MW DWR

On 18 April 1975, the Rheinisch-Westfälische Elektrizitätswerk AG (RWE) requested the Hessian Ministry for Economy and Technology to permit the erection and operation of Block C of the Biblis Nuclear Power Plant within the framework of the Atomic Law approval procedure. Two months later on 24 June 1975, the companies Kraftwerk Union AG (KWU) and Hochtief AG were commissioned to set up a turnkey ready 1300 MWe nuclear power plant with a pressurized water reactor.

On 10 October 1980, the approval request of 18 April 1975 for erection of Block C (and originally also Block D) was withdrawn. Because of plant changes that occurred in the meantime, an application for Block C was in any case submitted anew, using as a basis a new safety report.

On 12 February 1982, the Federal Minister of the Interior gave his approval to the Hessian Provincial Agency, as required by the Atomic Law, for granting the first TEG for Biblis C.

Construction of the Plant should begin in 1982/83. Transfer to the owner is not expect for 1989/90.

Owner and Operator: Rheinisch-Westfälisches Elektrizitätswerk AG (RWE).
Delivering Firm: KWU; reactor manufacturer: KWU.
Data: 1303 MWe gross, 1228 MWe net, 3765 MWth; pressurized water reactor
Location: Biblis/Rhein.
Granting of the Contract: 24 June 1975.
Approval: First TEG requested 18 April 1975, new request because of plan changes 10 October 1980; beginning of construction: Planned 1982/83.
Start-up: 1989/90.

Isar-2 KKI-2 1350 MW DWR

In December 1979, the space arrangement process for the second block of the Nuclear Power Plant at Isar (KKI-2) was concluded at Ohu, Landshut County. The system is being jointly erected and jointly operated by the Bayernwerk AG (40 percent), the Landeshauptstadt München - Stadtwerke (25 percent), the Isar Amperwerke AG (25 percent), and the Energieversorgung Ostbayern AG (OBAG) (10 percent). At the beginning of 1979, application for the KKI-2 was made in accord with Paragraph 7 of the Atomic Law, at the responsible approval agency, the Bavarian State Ministry for Provincial Development and Environmental Questions.

On 30 January 1980, a Letter of Intent was given to Kraftwerk Union AG (KWU) for the system with a pressurized water reactor (1350 MW gross, 1270 MW net).

On 12 February 1982, the Federal Minister of the Interior, as required by the Atomic Law, gave his approval to the Bavarian Provincial Agency for the issuance of the first TEG for the KKI-2.

The beginning of construction is expected in 1982, and start-up for 1988.

Owner: Bayernwerk (50 percent), Isar-Amperwerke (25 percent), Stadtwerke München (25 percent), EV Ostbayern (10 percent).
Delivering Firm: KWU; reactor manufacturer: KWU.
Data: 1350 MWe gross, 1270 MWe net, 3765 MWth; pressurized water reactor.
Location: Ohu/Isar (Landshut district).
Granting of the Contract: Letter of Intent 30 January 1980.
Approval: Preliminary site decision requested March 1976, first TEG requested 13 February 1979; beginning of construction: presumably 1982.
Start-up: 1988.

Neckar-2 GKN-2 1000 MW DWR

The Gemeinschaftskernkraftwerk Neckar GmbH (GKN) issued to Kraftwerk Union AG (KWU), on 19 March 1975, a contract for a second block of the Neckar Nuclear Power Plant near Neckarwestheim-Gemmrigheim/Neckar. Just like the first block GKN-1, this should have a gross power of 855 MWe and should comprise a pressurized water reactor. The Atomic Law erection approval was applied for on 23 June 1975.

Because of the long delays in the approval procedures, it was in the meantime decided to erect a plant with a higher power. In 1980, the planning work for a 1300 MWe nuclear power plant with a pressurized water reactor was taken up by the KWU.

On 27 November 1980, the corporate members of the GKN (Neckarwerke, Technische Werke der Stadt Stuttgart, Deutsche Bundesbahn and Zementwerk Lauffen - Elektrizitätswerk Heilbronn) requested a first TEG modified to a 1300/1200 MWe block. The approval documents were made public in July and August 1981. About 28,000 objections were received. The hearing date on these objections took place on 19 days between 1 December 1981 and 11 January 1982 in Neckarwestheim and Gemmrigheim. Four objections (Heilbronn and Ludwigsburg counties, and the cities of Beilstein and Güglingen) were withdrawn previously; the other objections were sustained. GKN expects the first TEG approximately in early summer 1982.

With a beginning of construction in 1982/1983, start-up by 1989/90 is expected.

Owner and Operator: Gemeinschaftskernkraftwerk Neckar GmbH (Neckarwerke 45 percent, TWS 32 percent, Deutsche Bundesbahn 20 percent, Zementwerk Lauffen/Elektrizitätswerk Heilbronn AG 3 percent).
Delivering Firm: KWU; reactor manufacturer: KWU.
Data: 1301 MWe gross, 1230 MWe net including traction current, 3765 MWth; pressurized water reactor.
Location: Neckarwestheim-Gemmrigheim/Neckar.
Granting of the Contract: 19 March 1975.
Approval: First TEG requested 29 June 1975, requested anew on 27 November 1980 because of plan changes; beginning of construction: expected 1982/83.
Start-up: 1989/90.

Neupotz A 1300 MW DWR

The Rheinisch-Westfälisches Elektrizitätswerk AG (RWE) and the Pfalzwerke AG, on 30 April 1977, issued a letter of intent for the turnkey-ready erection of a 1300 MWe nuclear power plant in Neupotz with a BBR pressurized water reactor, to the conglomerate BBC, BBR and Hochtief. The contract was granted on 27 November 1978. It expired on 31 December 1980, and was converted into an engineering contract. The owner and operator will be the KRP, in which the RWE had a 74 percent participation and the Pfalzwerke a 26 percent participation.

On 16 June 1977, an application was submitted to the responsible agencies for the erection and start-up of a nuclear power plant block (as well as application for a preliminary site decision for a second nuclear power plant block), and the safety report for evaluation of the safety design of the system was submitted. Because of delays in the approval procedure, the process had to be continued with a new safety report and a renewed publication [illegible] the documents.

The owners are currently expecting to begin construction in 1984 and start-up in 1991.

Owner and Operator: KRP (RWE 74 percent, Pfalzwerke 26 percent).
Delivering Firm: Konsortium BBC, Brown Boveri Reaktor GmbH (BBR) and Hochtief AG; reactor manufacturer: BBR.
Data: 1374 MWe gross, 1283 MWe net, 3760 MWth; pressurized water reactor.
Location: Neupotz/Rhein.
Granting of the Contract: Letter of Intent 30 April 1977, Contract 27 November 1978.
Approval: First TEG requested 16 June 1977.
Start-up:

Vahnum A and B 2 · 1300 MW DWR

On 29 November 1974, the Rheinisch-Westfälisches Elektrizitätswerk AG (RWE) requested approval to erect and operate a nuclear power plant with two blocks, each with 1301 MWe gross (1226 MWe net) at Vahnum on the Niederrhein between Bislich and Haffen-Mehr. On 23 November 1978, a preliminary site decision was requested. The application documents (safety report) were available to the public from 11 October to 10 November 1976. The hearing date was set for the beginning of February 1977, but was cancelled in January 1977 by the Provincial Government of Nordrhein-Westfalen. Under these circumstances, the dates for the beginning of construction and start-up are still open at the present. Originally, start-ups in 1984 and 1986 had been planned.

Owner and Operator: Rheinisch-Westfälisches Elektrizitätswerk AG (RWE).
Delivering Firm: KWU and Hochtief; reactor manufacturer: KWU.
Data: 2 · 1301 MWe gross, 2 · 1226 MWe net, 2 · 3765 MWth; two pressurized water reactors.
Location: Between Bislich and Haffen-Mehr at Vahnum/Niederrhein.
Approval: First TEG requested 29 November 1974; preliminary site decision requested 23 November 1978; beginning of construction is still open because of the energy-policy attitude of the Provincial Gorvernment of Nordrhein-Westfalen.

Pfaffenhofen A KRL 1300 MW DWR

The Rheinisch-Westfälisches Elektrizitätswerk AG (RWE), Essen, and the Lechwerke AG (LEW), Augsburg, in October 1975, founded a joint corporation, the Nuclear Power Plant RWE-LEW (KRL) with headquarters in Augsburg. RWE has a 75 percent participation in this corporation and LEW a 25 percent participation. The planned nuclear power plant should have an electrical power of 1368 MWe gross or about 1289 MWe net. The space arrangement process was requested in October 1976. At first, Rehling in the community of Rehling, on the eastern Lech Shore, about 12 km north of Augsburg, was proposed as a site.

On 29 January 1980, it was requested that the space arrangement process should also examine the site Pfaffenhofen at the Zusam (a region of Buttenwiesen), Dillingen County, which had provided in the Bavarian site safety plan as an alternative for Rehling. The space arrangement process was concluded by the District Government of Schwaben on 8 October 1981, in principle positively for the Pfaffenhofen site. The Rehling site, on the other hand, was not approved from the perspective of space arrangement and provincial planning.

The owner intends to request the first Atomic Law partial erection approval during the second half year of 1982 and is currently expecting to begin construction in 1984 and to begin operation in 1990.

Borken KWB 1300 MW DWR

The Preussische Elektrizitäts AG (Preussenelektra), on 11 September 1974, requested approval to erect a nuclear power plant with 1300 MWe at Borken, Kassel District. The plant should have a pressurized water reactor. There are no data for the start-up date.

Further Projects

Neupotz B 1300 DWR

The Rheinisch-Westfälisches Elektrizitätswerk AG (RWE) and the Pfalzwerke AG, on 16 June 1977, made application for the erection and start-up approval for the first block of their planned nuclear power plant at Neupotz/Rnein, and simultaneously requested a preliminary site decision for a second block for this power plant. Block B, just like Block A, should have a pressurized water reactor and should have a power of 1368 MWe gross or 1289 MWe net. At this time there are no data for the start-up date.

SNR-2 1300 MW Sodium-cooled, fast

The Europäische Schnellbrüter-Kernkraftwerksgesellschaft mbH (ESK), in which the German-Belgian-Netherlands-British SBK has a 51 percent participation, and the Italian Electrical Agency ENEL has a 33 percent participation, and the French Electrical agency EdF has a 16 percent participation, pursues, in terms of the SNR-2, the introduction of fast breeder nuclear power plants of commercial size.

The SNR-2 is the German opposite number to the French fast breeder demonstration power plant Super-Phénix which is currently under construction. As regards the construction and operation of both power plants, there is an agreement between the partners SBK (DEBENE), EdF (F) and ENEL (I).

The planning work on the 1300-MW demonstration fast breeder nuclear power plant SNR-2 was partly interrupted because of the strong capacity commitment, through the expensive and delayed SNR-300 approval procedure. After the approval boundary conditions for the SNR-300 became clearer, the preplanning work on the SNR-2 in a loop construction mode could essentially be concluded.

In a further planning phase, by the end of 1983, appropriate investigations on a pool construction mode will be performed so that then the decision concerning the final design can be made on a well-founded basis.

The SNR-2 Nuclear Power Plant should have a gross power of about 1460 MW3 and a net power of about 1300 MWe. Kraftwerk Union AG (KWU) is intended as the principal contractor; as the supplier for the reactor (3420 MWth) it is intended to use its subsidiary INTERATOM.

A building decision, which must be preceded by several years of detailing and approval steps, can be expected only by the end of the eighties.

4. Shutdowns

KKN Niederaichbach

The Niederaichbach Nuclear Power Plant (KKN) has been shut down since 31 July 1974. It is in the status of "Safe Enclosure". The approval to this by the Bavarian State Ministry for Provincial Development and Environmental Questions was granted on 20 October 1981. With the granting of this approval, the Niederaichbach system became the sole responsibility of the Kernforschungszentrum Karlsruhe GmbH (Karlsruhe Nuclear Research Center Ltd.).

The condition "Safe Enclosure" means that all still existing radioactive components and materials within the reactor building in the containment are enclosed safely against liberation of radioactivity to the biosphere and against access by unauthorized persons. All other buildings have been cleared and are free of artificial radioactivity. They can be accessed without restriction or can be used otherwise. The control area in the sense of the Radiation Protection Ordinance is limited only to the containment. The condition and operation of the secured enclosure is verified both by instruments and by control passages, inspections, and periodic reviews.

Since the fall of 1979, the planning work for the total removal of the system has been in progress. The goal of the planning phase is the issuance of all approvals that are required to begin the on-site work. In April 1980, the approval, required according to Paragraph 7 of the Atomic Law, for the total elimination of the system was applied for at the Bavarian State Ministry for

Provincial Development and Environmental Questions. The planning work for total removal has progressed to such a point that completion of the approval process and of the presentation of expert opinions can be expected by the end of the year 1982.

KWL Lingen

In the spring of 1979, the Kernkraftwerk Lingen GmbH decided to request, from the responsible approval agency, the shutdown of the nuclear section of the 250 MWe nuclear power plant Lingen (KWL) with a boiling water reactor and a conventionally fired superheater. The system, which was started up in 1968, had already been shut down since 5 January 1977 for the installation of new steam converters.

The shutdown of the Lingen Nuclear Power Plant (KWL) will take place in several partial steps. First of all, the "Safe Enclosure" of all radioactive materials in the nuclear area will be effected. The area of the safe enclosure will extend to the reactor, the processing building, and the intermediate structures in between.

In the year 1981, the non-irradiated fission elements were transported to Exxon Nuclear GmbH to recover the uranium contained therein. Of the irradiated fission elements, 128 elements, in 8 transports, were transported off for reprocessing in Windscale.

The original project to restart the conventional system parts of the nuclear power plant (turbo set, superheater, feed water preheating) at an early date by preconnecting a 200 MW gas turbine with a waste heat oiler was abandoned. Since the superheater and the turbine can be charged only with low pressure steam (55 bar), the efficiency of the system is relatively low. For this reason, the severe rise of natural gas prices made use of such a system uneconomical.

The official application for shutdown of the system will presumably be submitted during the course of the year 1982.

KRB-A Gundremmingen

The corporate members of the 250 MW demonstration power plant Gundremminggen Block A, in which the Rheinisch-Westfälisches Elektrizitätswerk AG (RWE) has a 75 percent participation and the Bayernwerk AG has a 25 percent participation, decided on 8 January 1980 to shut down the system.

The nuclear power plant with its boiling water reactor was erected between 1962 and 1966 as the first one of three German demonstration nuclear power plants - before Lingen and Obrigheim. Since an accident, which occurred on 13 January 1977 in connection with a power short circuit and which was connected with consequent damages in the system, the plant has been shut down.

After the decision for shutdown, a program for the earliest possible implementation of safe enclosure was set up. The essential preconditions such as e.g. the removal of the irradiated and non-irradiated fuel elements as well as the required rebuilding measures in the system here turned out to be decisive in determining dates. Taking into account a 1-year approval process, KRB expects approval for safe enclosure by the middle of 1984.

The removal of the non-irradiated fuel elements has been completed. The irradiated fuel elements are currently being transported to Cap la Hague for reprocessing. A contract was granted to the working community Nuclear Engineer Service GmbH (NIS) and Kraftanlagen AG (KAH) for planning the rebuilding measures required for safe enclosure. Within the framework of this contract, provision is made to investigate different variants of safe enclosure, from which the most suitable solution will be selected and will subsequently be planned in detail.

FOOTNOTES

1) Compare ATW report "New Nuclear Power Plants in the Federal Republic of Germany 1981,", ATW 26, p 257 (April 1981).

   In a comparison with the previous year, especially as regards nuclear power plant output, it should be noted that the operators or the delivering firm, in the case of some installations, have in the meantime changed their data because of plan changes or for other reasons. For these reasons, there are differences with respect to a direct extrapolation from the figures of previous years. The basis always is provided by individual data in the table "New Power Plants", which are based on the most recent information to the ATW questionnaire.

2) Compare ATW fast statistic "Nuclear Power Plants 1981 - World Survey" ATW 27, p 171 (March 1982) as well as statistics for electrical power generation from nuclear power plants for December 1981, ATW 27, p A 36 (March 1982).

8348
CSO:5100/2146

OFFICIAL REPORTS ON MURUROA RADIATION CONTAMINATION

Paris LE MATIN in French 11 Mar 82 p 4

[Interview with Louis Darinot, Chairman of National Assembly's Defense Committee by Pascal Krop; date and place not given]

> [Text] Louis Darinot, chairman of the National Assembly's Defense Committee, has returned from Mururoa. Heading a fact-finding mission, he met the civilian and military officials in charge of the French Center for Nuclear Testing. The delegation then went to Australia, where it was received by the foreign minister. Louis Darinot, who must report on his mission to Charles Hernu this morning, sums up his trip for LE MATIN.

LE MATIN: The ecologists and the CFDT [French Democratic Confederation of Labor] had claimed that the Mururoa atoll was severely contaminated. What did you notice during your trip?

Louis Darinot: The information furnished by the CFDT was partially correct. Part of the atoll sank in July 1979. Then, following a tidal wave at the beginning of 1981, some of the waste material which had been imprudently sealed in bitumen was released. That waste material had been put there a long time ago, after the last open-air tests. They were made 10 meters above ground in order to test certain chemical reactions. At present, however, there is no longer any problem. The decontamination of the beach in the central portion was carried out with a great deal of care. We even went bathing there. It is indisputable--and I know what I'm talking about, being interested in toxicology and physics--that there isn't anything left.

Question: So, no traces of the past accident remain?

Answer: Yes, but only on some small coral islets which haven't yet been decontaminated because those areas are deserted. Moreover, decontamination is very difficult to achieve. Uranium is not easily detected. In such areas, they put up signs reading "Area Not Decontaminated: Radiation Possible."

Question: There had been talk about moving the French Center for Nuclear Testing...

Answer: Those are just unfounded rumors. For example, the word circulated that they were going to move to the Kerguelen Islands. That's ridiculous. A month and a half ago, I made a trip to the Indian Ocean, and I could verify that the Kerguelen Islands are inaccessible for much of the year.

Question: And Fangataufa Island?

Answer: Indeed, in 1974 France did make several tests on this island, located 150 km south of Mururoa. So, there were tests in the past, and there should be further tests in the weeks to come. It isn't remote, but in any case it won't replace Mururoa.

Question: What measures have been taken to protect Mururoa against other tidal waves?

Answer: In the defense budget, we voted the credits intended to protect Mururoa. So, they built a 3-meter high concrete wall facing the Pacific Ocean on one side and the lagoon on the other. Its purpose is to protect against future tidal waves. In addition, in each of the residential areas there are now 4.5-meter high platforms on which the inhabitants can climb in case of flooding.

Question: What are you going to ask of Charles Hernu?

Answer: First, I would like a mission led by Haroun Tazieff to verify the condition of the coral. As positive as I am that there is no radioactivity at Mururoa, I am the first to admit that I am not qualified to determine if there is a danger of the coral collapsing. The experts on the scene noted the same radial and longitudinal faults on other islands where there had been no nuclear tests--Rangiroa for example, which is 1,200 km from Mururoa.

Question: You also met with the Australians?

Answer: Yes, I spent 8 days in Australia, where I met with the foreign minister. I gave him my solemn word that all the precautions have now been taken. I can tell you on the other hand that I would not be so sure if they were planning to start atmospheric tests again. I will also ask Charles Hernu to permit Australian Members of Parliament to visit Mururoa. However, I would understand if the minister could not grant my request.

9939
CSO: 5100/2120

BRIEFS

RINGHALS-4 GENERATOR START DELAYED--Ringhals-3 was restarted on Tuesday after being down almost 6 months. The reactor may operate at 40 percent power for 2 months, according to a permit granted by the Nuclear Power Inspection Board (SKI). After that the three poorly designed steam generators will be examined. Fueling of the syster reactor, Ringhals-4, has been delayed, however. According to the State Power Board, the reason for this is that formal discussions between the manufacturer, Westinghouse, and the Swedish Plant Inspectorate are underway. According to plans by the State Power Board Ringhals-4, Sweden's 10th nuclear reactor, was to have been loaded with nuclear fuel on 1 April. It will also operate for 2 months, but only at 20 percent power. Subsequently, its faulty steam generators will also be examined. Ringhals-4 probably can start up in 1 week. The State Power Board and Westinghouse have had a first meeting on the legal responsibility for the problem. The question is: who will pay for the mess. [Text] [Stockholm DAGENS NYHETER in Swedish 7 Apr 82 p 14] 9336

RINGHALS-3 PLANT RESTARTING--The State Power Board may restart the damaged Ringhals-3 reactor, but it may operate at only 40 percent power for a maximum of 1,500 hours, i.e. for 2 months. After that, the steam generators will be reexamined. On Friday the Nuclear Power Inspection Board (SKI) granted permission to the State Power Board to start up Ringhals-3. The reactor has been down since 20 October last year. At that time it was discovered that a pipe in one of the three steam generators was leaking radioactive water. Later it was found that several hundred pipes in the generators had been damaged, but only two had leaked water to the turbines. There are a total of 14,000 pipes. The damage occurred because water rushed through the pipes too rapidly causing vibrations. The vibrations caused the pipes to rub against the supports that hold them in place. As early as December last year the State Power Board wanted to restart Ringhals-3, but SKI was not convinced that this was safe. Now the State Power Board has presented additional material showing that the risk of new damage in the pipes due to wear is small--at least during a limited time. In addition, instruments have been installed to monitor the vibrations and warn the personnel if more damage should occur. The problem at Ringhals-3 and at Ringhals-4, which is not yet fueled, is probably the result of a design error by the manufacturer, Westinghouse. [Text] [Stockholm DAGENS NYHETER in Swedish 3 Apr 82 p 11] 9336

CSO: 5100/2142

END

JPRS 80838

18 May 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 144

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In JPRS 80776, 11 May 1982, No 140 of this series, please change No 140 on Cover and Table of Contents page a to read No 142.

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JPRS 80838

18 May 1982

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 144

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JABILUKA URANIUM MINE OK'D AMID ONGOING CONTROVERSY

Federal Approval

Brisbane THE COURIER-MAIL in English 17 Mar 82 p 22

[Text] CANBERRA. — The Federal Government yesterday approved development of Australia's biggest uranium mine, Jabiluka, in the Northern Territory.

But supply contracts would not be given the go ahead until an agreement between the Northern Land Council, representing Aboriginals, and the project venturers was finalised.

The joint partners, Pancontinental Mining Ltd and Getty Oil Development Co. Ltd, have been negotiating with the NLC for the last 13 months with the aim of working out an acceptable deal for development.

The two parties signed an agreement on February 27 following endorsement of the mining plan by the traditional land owners.

Mr Anthony said supply contracts could be entered into once the agreement with Aboriginals was approved by the Aboriginal Affairs Minister, Senator Baume.

Mr Anthony said approval had to be conditional because the mine was on land that would eventually be controlled by an Aboriginal land trust.

The project, which is expected to cost more than $600 million, was within the boundaries of the proposed second stage of the huge Kakadu National Park.

But in line with government policy, the mine would be excluded from the park once it went ahead.

ALP Opposition

Canberra THE AUSTRALIAN in English 18 Mar 82 p 2

[Article by Laura Veltman]

[Text] THE Minister for Trade and Resources, Mr Anthony had obviously succumbed to pressure from Pancontinental Mining Ltd and Getty Oil Development company in giving conditional approval for the Jabiluka uranium project to proceed, the ALP claimed yesterday.

Labor's spokesman on conservation and the environment, Mr Stewart West, said the two companies were concerned a contracting world uranium market could cause them to miss out on maximum sales, thus placing their $600 million investment in the Northern Territory at risk.

"The Jabiluka partners are proceeding at their own risk in the full knowledge that Labor policy is for a moratorium on uranium exports," Mr West warned.

On Tuesday, Mr Anthony announced conditional approval for the development of the Jabiluka project.

Mr West said the Northern Territory Government could not be trusted to adequately protect the environment of Kakadu National Park, which bordered the proposed uranium mining site.

The project area should be incorporated into Kakadu National Park.

"The continued listing of the park on the World Heritage List could now be placed in jeopardy by this huge uranium mine," Mr West said.

The conditional approval to the Jabiluka partners was granted on the basis of increased Australian equity in the project by 10 per cent and the agreement of traditional Aboriginal owners, represented by the Northern Land Council.

CSO: 5100/7525

BRIEFS

NUCLEAR-FREE PACIFIC ACTION--The ACTU and trade unions in other Pacific countries will consider introducing trade bans in protest against nuclear activity in the Pacific region. A meeting of the Australian and New Zealand Trade Union Co-ordinating Council, in Melbourne yesterday, discussed plans to step up the campaign for a nuclear-free Pacific. It was decided that further representations should be made to the French Government to condemn French tests at Mururoa Atoll. The president of the ACTU, Mr Cliff Dolan, said it was possible that action be taken to disrupt the import and export of French goods. [Text] [Melbourne THE AGE in English 16 Mar 82 p 18]

ATOMIC WORKERS' VULNERABILITY--Canberra.--A Queenslander had been refused a life insurance policy because he had worked at one of the government's atomic test bases, Federal Parliament was told yesterday. Senator Keeffe (ALP, Qld) said an insurance company would not give the man a policy on the grounds that his life expectancy was shortened through working at Maralinga, South Australia. The government leader in the Senate, Senator Carrick, said he had not heard of such a case, "but that was not to say it had not happened." He said he would ask the National Energy and Development Department to investigate the claims. He also urged all former employees of government testing bases to contact his department as part of a study into the effects of working at the atomic stations. Senator Carrick said his department already had located records belonging to 10,000 former employees. Another 5000 still had to be found. Senator Keeffe said an air force doctor had told the man to leave Maralinga for health reasons after being there for less than a year. [Text] [Brisbane THE COURIER-MAIL in English 17 Mar 82 p 10]

CSO: 5100/7525

BRIEFS

VIENNA CONFERENCE PLANS--Bangladesh has been invited to participate in the international conference on Nuclear Power Experience to be held in Vienna in September this year, says a Press release. The conference will be organised by the International Atomic Energy Agency (IAEA), a UN organisation for promotion of nuclear power for peaceful purpose. ENA adds: The aim of the coming IAEA conference is to give indepth review of problems faced in implementation and operation of nuclear power projects, reliability cost economics and safety aspects of nuclear power lessons learnt from the experience gained and their implications for the future. About 225 papers will be presented in the conference by outstanding scientists and engineers from 37 countries including Bangladesh. [Text] [Dacca THE BANGLADESH OBSERVER in English 15 Apr 82 p 3]

CSO: 5100/7083

BRIEFS

FRENCH N-TEST PLEDGE--Paris, Fri: The Prime Minister of Fiji, Sin Kamisese Mara, says he has been assured by the French President, Mr Mitterrand, that everything will be done to end nuclear tests in the Pacific. Sir Kamisese told reporters that Mr Mitterrand had given him the assurance in recent talks on Pacific affairs and other issues. The Prime Minister, on his first visit to France, also said that Mr Mitterrand outlined the reforms that his Government was undertaking in the French Pacific territory of New Caledonia.--AAP-Reuters. [Text] [Perth THE WEST AUSTRALIAN in English 13 Mar 82 p 2]

CSO: 5100/7524

REAGAN POLICY SAID TO BODE ILL FOR TARAPUR PACT

Madras THE HINDU in English 7 Apr 82 p 1

[Article by G. K. Reddy]

[Text] NEW DELHI, April 6.

The Reagan Administration is inclined to relent a little and supply some of the critical spare parts required for the Tarapur atomic power plant without prejudice to its stand on the fuel question, according to the latest reports from Washington.

The U.S. Embassy in Delhi has been strongly urging the administration to keep the two issues separate and not let the continued disagreement on fuel replenishment come in the way of supply of spares for routine maintenance of the plant.

A decision is expected shortly granting the necessary export permits for the shipment of the minimum spare parts required for running the Tarapur power station with the requisite margin of safety as recommended by Westinghouse, which had built the plant. Though there is no imminent danger of a mishap as a result of some defective components or faulty instrumentation, it is necessary to replace the malfunctioning parts to adhere to the prescribed safety standards and maintenance requirements.

Deadlock continues: But on the main issue of fuel supply the deadlock continues with neither India nor the U.S. making any fresh move to reopen the issue with some new suggestions. As India is not in any great hurry to revoke the agreement, the U.S. apparently sees no harm in keeping the whole thing in abeyance until such time that the two sides are ready to talk again.

Meanwhile, the Government is getting ready for performance review, by the IMF before the release of the next instalment of the loan. The Indian Director on the IMF Board, Mr. M. Narasimham, will be arriving from Washington for policy discussions with the Government on the subject.

It remains to be seen what stand the U.S. representative is going to adopt during this review: whether he will pose some embarrassing questions which might compel India to forego the rest of the IMF loan. In either case, it will be indicative of the Reagan Administration's evolving attitude towards India, whether there will be a further hardening on its part or greater flexibility in dealing with it.

The new strains that have developed in Sino-American relations over U.S. arms supplies to Taiwan is indicative of the Reagan Administration's rigid approach to various global problems, including the question of rearming Pakistan. If this mood continues to prevail in Washington, it will be very difficult to evolve any compromise over the Tarapur problem. The mere supply of a few critical spares is not going to make much difference to the main controversy over the legalities of the U.S. refusal to continue to comply with its contractual obligations.

The fact that India has gone as far as it could in the present circumstances, consistent with its own nuclear policy, in holding out the promise privately that it has no intention of going in for another test in the near future, has not met with a matching response from the U.S. side. The Reagan Administration continues to evade in one way or the other its responsibility to keep up the flow of fuel supplies, even though it is no longer insisting on fullscope safeguards on the entire field of nuclear activity in India as an essential pre-condition.

The current deadlock in the Indo-American nuclear dialogue relates primarily to the safeguards involved in an orderly termination of the Tarapur agreement. Despite the unilateral repudiation of its contractual obligations, the U.S. has been insisting that India should retain the safeguards in a mutually agreeable form on both the plant and the spent fuel so that the plutonium derived from reprocessing cannot be used for any purpose, peaceful or non-peaceful, without the prior consent of Washington.

CSO: 5100/7078

BHABHA DIRECTOR OPENS SYMPOSIUM ON NUCLEAR COMPONENTS

Bombay THE TIMES OF INDIA in English 9 Apr 82 p 6

[Text] BOMBAY, April 8.

NUCLEAR energy is the greatest gift of nature and science. Indian scientists shall do everything to exploit it with indigenous technology while there is still some time to do so, according to Dr. Raja Ramanna, director of the Bhabha Atomic Research Centre here.

Inaugurating the two-day national symposium on "Manufacture of nuclear components" under the auspices of the Board of Research in Nuclear Sciences, Dr. Ramanna said that nuclear power in India was coming out of a period of adolescence and the difficulties faced by it resembled that period in actual life.

If the Indian manufacturing companies progressed at the same pace as they did in the past 15 years, very soon India would be in a position to manufacture all equipment and components needed for our nuclear industry, he felt. When the Indian nuclear programme became a little larger, various indigenous manufacturers, fabricating nuclear components, would set apart an exclusive shop for such components, Dr. Ramanna added.

However, India still depended on foreign manufacturers for some components, essential for the power reactors, he said.

RESEARCH REACTOR

While all the major components for unit I of the Rajasthan Atomic Power Project were imported, for the second unit of the Narora Atomic Power Project, all of them were being made in India, Dr. Ramanna said. Most of the components and equipment for the research reactor R-5 at Trombay and for the Fast Breeder Test Reactor at the Reactor Research Centre, Madras, were made in India.

In his keynote address, Dr. Srinivasan said delays of three or four years had been experienced in the delivery of major nuclear equipment and the inability to mientain delivery schedules was the main problem with the industry both in the public and the private sector. Technical problems arising during the course of manufacture and the developmental nature of the job involving a learning process, mainly led to the delays in the delivery of the equipment, he added.

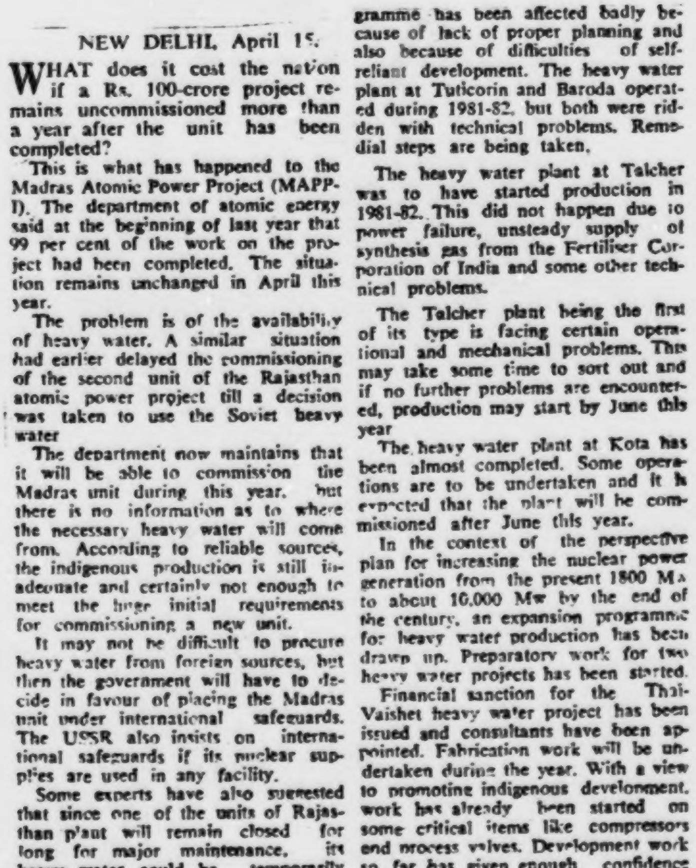
CSO: 5100/7081

ATOMIC POWER UNIT STILL AWAITS COMMISSIONING

Bombay THE TIMES OF INDIA in English 16 Apr 82 p 7

[Article by K. Sharma]

[Text]



NEW DELHI, April 15.

WHAT does it cost the nation if a Rs. 100-crore project remains uncommissioned more than a year after the unit has been completed?

This is what has happened to the Madras Atomic Power Project (MAPP-I). The department of atomic energy said at the beginning of last year that 99 per cent of the work on the project had been completed. The situation remains unchanged in April this year.

The problem is of the availability of heavy water. A similar situation had earlier delayed the commissioning of the second unit of the Rajasthan atomic power project till a decision was taken to use the Soviet heavy water

The department now maintains that it will be able to commission the Madras unit during this year. but there is no information as to where the necessary heavy water will come from. According to reliable sources, the indigenous production is still inadequate and certainly not enough to meet the huge initial requirements for commissioning a new unit.

It may not be difficult to procure heavy water from foreign sources, but then the government will have to decide in favour of placing the Madras unit under international safeguards. The USSR also insists on international safeguards if its nuclear supplies are used in any facility.

Some experts have also suggested that since one of the units of Rajasthan plant will remain closed for long for major maintenance, its heavy water could be temporarily loaned to the Madras unit for initial charging. This can be done if the domestic availability of heavy water is expected to go up in the next few months.

The heavy water production programme has been affected badly because of lack of proper planning and also because of difficulties of self-reliant development. The heavy water plant at Tuticorin and Baroda operated during 1981-82. but both were ridden with technical problems. Remedial steps are being taken.

The heavy water plant at Talcher was to have started production in 1981-82. This did not happen due to power failure, unsteady supply of synthesis gas from the Fertiliser Corporation of India and some other technical problems.

The Talcher plant being the first of its type is facing certain operational and mechanical problems. This may take some time to sort out and if no further problems are encountered, production may start by June this year

The heavy water plant at Kota has been almost completed. Some operations are to be undertaken and it is expected that the plant will be commissioned after June this year.

In the context of the perspective plan for increasing the nuclear power generation from the present 1800 Mw to about 10.000 Mw by the end of the century, an expansion programme for heavy water production has been drawn up. Preparatory work for two heavy water projects has been started.

Financial sanction for the Thal-Vaishet heavy water project has been issued and consultants have been appointed. Fabrication work will be undertaken during the year. With a view to promoting indigenous development. work has already been started on some critical items like compressors and process valves. Development work so far has given enough confidence that such equipment can be produced indigenously.

The department has also prepared the feasibility report for another new heavy water project. work on which will also begin during this year.

CSO: 5100/7082

REPORT ON RAJASTHAN NUCLEAR PLANT TELLS FAULTS

Bombay THE TIMES OF INDIA in English 5 Apr 82 p 6

[Article by S. Kumar]

[Text] BOMBAY, April 4.

A TECHNICAL audit report on the functioning of the Rajasthan Atomic Power Station (RAPS) has held that the plant authorities have flouted certain basic technical rules.

The reactor building provides the third and ultimate barrier to the release of any radio activity into the environment and a limit to the radioactivity leak in the area has been specified. But reactor building of the unit I has shown a radioactivity leak five times higher in January 1981 and nine times higher in October 1981.

The concentration of heavy hydrogen in the system should not exceed 4 per cent as it might lead to an explosion but last year, on several occasions, the concentration of the gas had exceeded the limit.

In cases of emergency, certain valves in the "dousing system" (which flushes water inside the reactor building to keep the room temperature and pressure at low level) should open partially within 800 milliseconds after the alarm. But, during routine weekly examinations, valves in unit I took as much as 2,300 milliseconds to open partially and some other valves did not open at all. This delay is quite risky as the whole dousing curtain should be formed within 2.7 seconds after the accident.

Two motor generators and two diesel generators are provided at the atomic power station as a safety measure. The reactor is not permitted to be operated above 2 per cent full power even if one of the four sets is not operable. It has been observed on a number of occasions that the unit II was kept at normal operating power level even when both the diesel sets were not available, for a period ranging from a few minutes to a few hours.

"DOUSING INCIDENT"

The liquid radioactive effluents from the plant are processed through dispersal tanks in the Liquid Effluents Management Plant and the radioactivity levels in the dispersal tanks have been specified not to exceed 50 per cent at any time during reactor operation. Frequently, this limit has been exceeded.

Another report on the unwarranted "dousing incident", which occured at the RAPS on December 18, 1980, says that the incident took place "as a compounded result of equipement malfunction and operator error in assessing the situation." However, modifications have been done in operating procedures and in the system to mitigate the possibility of inadvertant dousing in future.

As this was an unwarranted dousing, the radioactivity level of the water was low and the contaminated water could be discharged to a lake. In case of actual break in systems, the activity levels will be high. At present no system is available at the plant site for processing or storing this water. Such a system is being designed.

The Technical Audit Group at the RAPS is intended to keep track of the safety aspects of the power station and to ensure that the design intents are fully met. Also, the group follows up deviations in procedures and brings them back to normal. The plant can live with the deviations also with special controls but they should not be totally forgotten.

The Technical Audit Group functions independently from the Health Physics division which conducts its observations separately. But its remarks are kept a secret unlike in the case of the technical audit. The technical audit report formed a part of the proceedings of the second national symposium on "Operating experience of nuclear reactors and power plants," held at the BARC recently.

The technical audit report should not be treated as an indictment of the plant operators. In fact, it brings credibility to the nuclear power programme and the department of atomic energy by its frank and non-complacent approach. The group, at least apparently, is not under the clutches of the DAE.

The observations of the audit group were not, in themselves, very dangerous. But, they provide an insight into the performance of the organisation and also serve as an effective management tool for assessing the effectiveness of various operations.

CSO: 5100/7076

LACK OF SAFETY MEASURES AT NUCLEAR FUEL COMPLEX CRITICIZED

New Delhi INDIA TODAY in English 30 Apr 82 p 59

[Text] SAFETY and security measures at the Nuclear Fuel Complex (NFC) in Hyderabad seem to have hit a new low with two accidents last month. Whether it could have been avoided is debatable but the manner in which two children died after extensive burns in a strange fire on March 6 and how the NFC ushered in the Telugu New Year (March 26) with a bang at the zirconium sponge plant reveals basic safety lessons are still being learnt at the complex—the kingpin of the country's atomic energy programme.

In a negligent act a woman and three children were killed and at least 12 others injured in the blaze of March 24 last year. Flammable zirconium scrap caught fire as the drums containing the material were off-loaded from a lorry by the roadside killing innocent passers-by (INDIA TODAY, April 16-30, 1981). This year the NFC is on safer ground and is not totally responsible for the death of Velu, 9, and Palaniamma, 5, in what remains a mysterious fire at its non-combustible waste dump. Paradoxically, the two children and their mother 35, went there to collect fire wood. Lakshmi recalls: "There was a loud noise and the flames leapt high. The next moment the girl ran and the boy was thrown back after both had been burnt."

The girl died that night and the boy next morning at the Gandhi Hospital. Lakshmi, the lone eyewitness is at a loss to explain how the matter ignited. As illiterate migrant labourers from the Dharamapuri district of Tamil Nadu, Lakshmi and her husband Gopal are so ignorant that they refused to accept the ex-gratia of Rs 500 for the loss of each child offered by the Government presuming it to be a bribe to buy their silence. So when the Hyderabad-East Sub-divisional Magistrate M.B. Ramswamy began the enquiry on March 24 he had to explain repeatedly that questions being asked were only to ascertain facts and not an indictment. Surprisingly the NFC with all its scientific methods for disposal of wastes is also unable to explain the explosion. Argues a senior NFC official, "The fire is a mystery even to us, since the area has not been used as a dump for the past two years." Nevertheless, the lumps of magnesium chloride found in the dump were fresh; two-year-old waste would have leached and been carried away by the rain. Combustible zirconium filings have also been found there by the police who have promptly registered a case of death due to negligence against the NFC. Already five NFC officers are facing similar charges in the March 1981 case.

Investigating: Another telling indicator is a blackened patch on the rocky scrubland that is used as the dump. The flammable material, zirconium or anything else, would have had to have been present in significant quantity to leave that tell-tale sign. In their anxiety to disown responsibility for the fire NFC officials argue that if zirconium had been present as in last year's case, "The burns would have been intensive and of the third degree in which the flesh is virtually cooked." Post-mortem reports show Velu and Palaniamma died of shock following first and second degree burns. Now, it is for the police and the investigators of the Department of Atomic Energy (DAE) to establish the cause of the fire.

The poor response of the NFC staff to the incident is obvious. Syed Ghulam Rasool, an employee of a cycle rickshaw shop, who took the children to the Gandhi Hospital says when he telephoned the NFC from the Hospital on March 6 evening, the person who answered did not believe him. It was only the next morning and, as Rasool says, "perhaps after reading the newspapers", that the NFC began to evince interest. Apparently the NFC security needs tip-offs from outsiders to know what is happening on the 500-acre complex. The incident happened at about 4 p.m. in the peripheral 200 acres that lie beyond the tightly guarded 300-acre "Prohibited" area. Vigil in the peripheral area is poor and the security staff is not sufficiently strong to man the entire complex.

Faulty Furnace: The Telugu New Year explosion in the zirconium sponge plant was due to the lid blowing off one of the four reduction furnaces in which zirconium chloride is treated with magnesium metal to get reactor grade zirconium sponge and magnesium chloride as the by-product. These furnaces, commissioned in 1971, used to be filled from the bottom till 1976 when they were redesigned to enable top loading so as to increase productivity and reduce maintenance time. Each reduction process lasts about 40 hours and although 2,400 processes have been completed, using that furnace the pressure fluctuations are surprising, says a plant source at the zirconium sponge plant. The accident occurred following swift pressure changes which tore the lid off, blasting it right through the asbestos roof.

Now a high level safety review committee is investigating how the furnace failed and the fire deaths occurred and they will recommend steps to be taken to improve safety measures at the NFC. Meanwhile, the peripheral 200-acre open area is being fenced and security men are to patrol its perimeter round the clock. Following the 1981 incident the NFC has double-fenced its waste disposal facilities and is to strengthen it with a two-kilometre wall costing Rs 12 lakh. But once again the obvious preventive – that safety and health measures in the DAE units be enforced by an independent agency – is being conveniently ignored.

AMARNATH K. MENON

CSO: 5000/5732

NUCLEAR FUEL COMPLEX GETS ORDER FROM WEST GERMANY

New Delhi PATRIOT in English 8 Apr 82 p 5

[Text] **HYDERABAD, April 7 (UNI)**

THE Nuclear Fuel Complex (NFC) here has bagged orders worth over a crore of rupees for supply of zircoloy products to West Germany.

NFC cheif executive N Kondala Rao who had just returned from Bonn told UNI that more orders were in the offing.

He said it was a matter of pride for NTC to supply zircoloy products to West Germany which had hitherto been buying them from France and the USA.

Mr Rao said the first consignment had left on Monday and the rest would be exported shortly.

The zircoloy tubes manufactured in NFC are used as containers for nuclear fuel.

Mr Rao said NFC had also sent samples of high purity material produced in the special material plant to West Germany and Japan. This was used for electronic products, he added.

He said NFC would supply technology for the 10-tonne titanium plant proposed to be set up in the Defence Metal Research Laboratory (DMRL) here to manufacture titanium metal sponge. NFC had developed the required technology in its pilot plant but it had not been put to use.

Mr Rao said titanium was available in plenty in Kerala and ultimately the Kerala Mineral and Metal Corporation would set up a larger titanium plant.

He said the titanium plant at the DMRL might be set up in a couple of years.

CSO: 5100/7080

BRIEFS

PLUTONIUM FUEL PLANS--New Delhi, April 15 (PTI)--The department of atomic energy (DAE) has launched a Rs. 91.2 million project for making plutonium fuel for the second generation nuclear power plants. The DAE annual report for 1981-82 said, "The project envisages the development of Solgel process for making plutonium bearing nuclear fuels for thermal and fast reactors on a pilot plant scale." The atomic reactors operating today use either enriched uranium or natural uranium as full-plutonium is the fuel proposed for the next generation of nuclear plants in the country. The annual report said that the pilot plant making plutonium fuel "is expected to be commissioned by December 1983." Regarding the fuel for Tarapur plant, the report said that the entire stock of enriched uranium imported from the United States "was exhausted in the beginning of September 1981." The DAE said that the Nuclear Fuel Complex in Hyderabad "is at present processing available scrap" to feed Tarapur plant. The report said that the eighth refuelling of the unit-2 of the Tarapur plant would be due in June--an indication that the power plant will be in operation for at least until June 1983. The Tarapur unit has completed 12 years of operation so far. Meanwhile, initial studies on the fifth atomic power project at Kakrapar in Gujarat have begun. The report said that investigations on the foundation condition and procurement of raw materials were in progress. The Kakrapar atomic power project would be commissioned by 1991, the report said. The DAE said that 90 percent of the work on the fast-breeder test reactor in Kalpakkam had been completed. It will be completed by the end of 1983. The report said that more heavy water plants were to be set up in the current plan period starting with one at Thal Vaishet. Another heavy water plant proposed will be similar to the Kota heavy water plant of Indian design. The plant would have a capacity of 200 tonnes, the report said. [Text] [Bombay THE TIMES OF INDIA in English 16 Apr 82 p 1]

JANATA LEADER FAVORS 'GOING NUCLEAR'--Chandigarh, April 6--Janata Party national executive member and a former MP Krishan Kant has advocated that India should go in for nuclear weapons. He has also pleaded that India should welcome Pakistan going nuclear. Talking to newsmen here today, he said when both countries went nuclear, the doctrine of mutual destruction would work as it was working with the super powers. Then no adventurer either in India or in Pakistan would venture on a conflict. Indo-Pak power balance cannot come without that. In his view, going nuclear would help in doing away with the hegemony of super powers. Answering questions, he said where was the question of disarmanent when there was no armament. Armament must come first. Why should we object to Pakistan or other decolonised nations going nuclear? This would be another assertion of their national identities in worldwide advance of backward nations. What I am against is India losing its lead in nuclear technology which she had after Independence. India was ahead of China in the fifties. Now it was behind China by seven to 10 years. Pakistan was racing ahead. Future India will not forgive the past and the present rulers if they let this lead pass out again even in respect of Pakistan, he said. He did not agree that such a compulsion would be against Gandhian principles, it would rather be in tune with them. [Text] [New Delhi PATRIOT in English 7 Apr 82 p 10]

CSO: 5100/7079

PROSPECTS OF EC NUCLEAR FUSION PROGRAM DISCUSSED

Duesseldorf ATOMWIRTSCHAFT-ATOMTECHNIK in German Mar 82 pp 149-153

[Article by Prof Dr K. H. Beckurts, member of the managing board of Siemens AG, Otto-Hahn-Ring 6, 8000 Munich 83: "Nuclear Fusion--A Chance for Europe"]

[Text] Immediately after the establishment of Euratom, the member states decided to group together relevant projects being worked on in their laboratories into a European program for research and development in the area of nuclear fusion. From 1959 on, the EC Commission accepted a key role as coordinator of this program, which today has as participants not only the EC member states but also Sweden and Switzerland. About 1,000 scientists in all are working in this program. The total financing for the overall program within the period 1979/83 comes to 877 million ECU [European Currency Units]. Of this, the host countries are paying 492 million ECU and the Commission is covering 385 ECU. The execution of the program is being done within the framework of association agreements between Euratom and those organizations in member states which are active in the area of fusion, as well as in connection with the joint enterprise JET [Joint European Torus]. Some projects are also being carried out at Ispra.

At the end of 1980, the EC Commission set up an advisory panel (European Fusion Review Panel) with the task of "making assessments of the following, with due regard for international developments in the area of nuclear fusion:

"- the present status of research and development work in the area of fusion within the framework of the Community's fusion program,

"- other developmental prospects for fusion as an energy source for the Community,

"- the future plans for the Community's fusion program, above all with respect to the next major stage,

"and the elaboration of recommendations for the further shaping and executing of the Community's program."

This panel, which was at work in the period from January to June 1981, was made up of ten experts1) from seven countries, under the chairmanship of the author. The panel's report2) was delivered over to the Commission on 6 July 1981. The Commission endorsed the recommendations contained in this report to a large degree. Some of the more important conclusions and recommendations of this panel are summarized in what follows.

1. Nuclear Fusion as an Energy Source for West Europe

In 1980 West Europe consumed about 1 billion tons of crude oil units (t ROeE) of primary energy. Of this, about 55 percent was imported, above all in the form of petroleum and natural gas, for which about 100 billion European Currency Units (ECU) had to be paid out in foreign exchange to other parts of the world, above all to the OPEC countries. In view of a probable further increase in the energy demand and considering the very small European oil and gas deposits, the situation may become even more critical. Thoroughgoing energy-saving measures, an increased use of coal, the continued buildup of fission reactors, and the full utilization of the potential from regenerable energy sources can bring about a change in the next few decades. The technology required for this is available today for the most part, and its application depends above all on political and economic factors as well as on the attitude of the public to the new technologies and their effects on the environment. In this way, Europe can get through the period up to the next century with respect to its energy consumption. But new and almost inexhaustible sources of energy have to be tapped to provide for the time when oil, coal, and uranium become scarce and expensive.

Nuclear fusion has good prospects of becoming one of these almost inexhaustible energy sources. On the basis of the deuterium-tritium reaction--with tritium being produced from lithium, which is found in nature and is widely available in Europe--the accessible energy resources in the world add up to $3 \cdot 10^{12}$ to $3 \cdot 10^{16}$ t of ROeE[3)]. On the basis of the deuterium-deuterium reaction, the deuterium content in the oceans corresponds to 10^{20} t of ROeE. Compared to these resources, the present annual world energy consumption amounts to about 10^{10} t ROeE.

But in assessing a new source of energy, other factors must be taken into consideration as well in addition to the availability of fuel reserves. It is asserted now and then that fusion reactors will be safe and clean compared to conventional fission reactors. Neither claim is entirely correct. Although no monitoring system is needed to guard against the danger of a nuclear power excursion, the reacting plasma is held together and isolated from the vessel walls by strong magnetic fields, and the energy stored in these fields is very great. A sudden release of this energy through a malfunction of the coils or through other accidents is a potential danger, above all because of the large inventory of radioactive tritium and the structural materials which have been activated by neutrons. The high neutron flux in the reactor damages the structural materials and impairs their mechanical integrity. In principle, means are known for overcoming these and other potential dangers in connection with fusion reactors.

In contrast to nuclear fission, the reaction products of a fusion reactor are not radioactive. Nevertheless, because of the neutron activation of the reactor structure a problem does exist with respect to the storage of radioactive waste. But the radiotoxicity of the wastes from a fusion reactor is less than that of the wastes from a fission reactor--above all on a long-term basis--since there are no wastes with a long-lived alpha activity.

Consequently, fusion reactors will not be completely safe or completely clean. They involve possible dangers and environmental risks, but in comparison to other significant energy sources they definitely show potential advantages. There even exists the remote possibility of the development of advanced fusion fuel cycles--for example, on a pure deuterium basis--in which the risks due to tritium would be largely eliminated and the induced radioactivity would be reduced.

One must assume that three important developmental stages must be reached before fusion can be adopted on a large scale as an energy source:

- Scientific feasibility--that is, the proof that under laboratory conditions a reacting fusion plasma can be confined for a sufficiently long time and that a positive energy balance can be achieved. Presumably this scientific feasibility will be demonstrated in the 1980's from the large tokamak experiments whose construction is already well advanced (JET in Culham, TFTR [Tokamak Fusion Test Reactor] in Princeton, JT-60 in Tokai Mura).

- Technical feasibility--that is, the proof that the fundamental technical problems of the fusion reactor can be solved. Examples: Tritium handling on a large scale, the behavior of materials under extreme radiation exposure, the remote operation of very complex equipment, and the conversion of fusion energy--which appears predominantly as kinetic neutron energy--into a utilizable form of secondary energy. To demonstrate this technological feasibility is the main goal of several very large and expensive devices which are being considered at present in various parts of the world (NET [Next European Torus] in Europe, FED in the United States, FER in Japan, INTOR as a joint project of the EC, the United States, the USSR, and Japan). Here the hope is that construction will be started on at least one of these facilities by the middle of the 1980's.

- Commercial feasibility--that is, the proof that power plants using fusion reactors can be built and reliably operated on an industrial scale, and that in comparison to other sources of energy they can generate usable energy at competitive prices. Various studies have arrived at widely divergent cost estimates, but although these are higher than costs for conventional nuclear power plants they lie within the same order of magnitude. However, a definitive assessment would be premature at the present time. It is very unlikely that commercial feasibility can be achieved with the generation of devices which will be built subsequent to the demonstration of technical feasibility. It is more likely that at least one intermediate step will be necessary to demonstrate the feasibility of the fusion-reactor power plant.

From the above it follows that the journey toward commercial fusion will be long and expensive and will require the solving of extraordinarily difficult technical problems. In view of the many steps which have to be taken still, it is unlikely that energy from commercial fusion reactors will be in common use within the next 50 years, and by that time expenditures worldwide for research, development, and demonstration devices will probably have grown to over 100 billion ECU.

These problems have been known about for a long time. In addition there is the question of what attitude future societies will have toward this new energy source. Nevertheless, there is worldwide agreement that the potential advantages of harnessing on earth the energy source of the stars are so enormous that they justify this extraordinary effort. The USSR, Japan, and the United States are carrying out ambitious long-range fusion research programs. The American program is the most extensive so far. In 1980 in the United States, a Magnetic Fusion Engineering Act was passed which calls for a considerable expansion in research work. In Japan as well, activities in this field are increasing very fast. Therefore the European advisory panel is of the opinion that Europe must continue to maintain a high status in fusion research.

Fusion cannot be viewed independently of other options for practically inexhaustible energy generation--for example, the employment of the breeder reactor or the extensive use of solar energy. The fast breeder has already been developed up to the commercial stage, but its social and political acceptance is running up against serious difficulties in some European countries. The economic efficiency of the solar energy systems, which are at an early stage of development still, depends on the geographical location, on the climate, and on the required power densities, and all of these conditions appear rather unfavorable for highly industrialized and densely populated Europe. Because of these problems and uncertainties, the only reasonable strategy for the future should lie in not neglecting any of the long-range options for our energy supply, but in following instead all of these paths in parallel and always with the appropriate funds.

Like other industrialized countries, Europe is facing a very serious challenge at present: In the midst of an economic recession, it must engage in a complex and expensive course of action which will manage to reduce our dependence on oil and find substitutes for it among "medium-term" energy sources. But at the same time preparations must be made also for a further transition to practically inexhaustible long-range energy sources, which is to be achieved through expensive research and development programs. In view of the urgent short-range and intermediate-range problems, a look ahead beyond more than 50 years may not seem to be very warrantable. But if Europe does not now continue its development of fusion energy on an adequately broad level, this important energy option will not be available to future generations when it is needed.

2. Status of European Research in the Area of Fusion

In the past decade, the European program has concentrated increasingly on the most promising system--the tokamak. Table 1 shows the most important large European tokamak facilities, and Figure 1 gives a survey of the laboratories which are participating in the nuclear-fusion field.

In this sector, Europe has proved to be fully competitive. In connection with the tokamak system, Europe has been particularly successful in the field of plasma heating. The highest $n\ \tau\ T$-product has been achieved at Frascati, and in the coming 10 years JET will be the largest fusion device in the world.

Only about 10 percent of the Community's present activities are directed toward a few carefully selected alternative systems, which in lying within the family of toroidal magnetic confinement systems not only will be alternatives to but also will make contributions to the tokamaks. The work on mirror devices has been completely halted. Less than 2 percent of the current budget is being spent on laser developments and investigations of light-matter interactions.

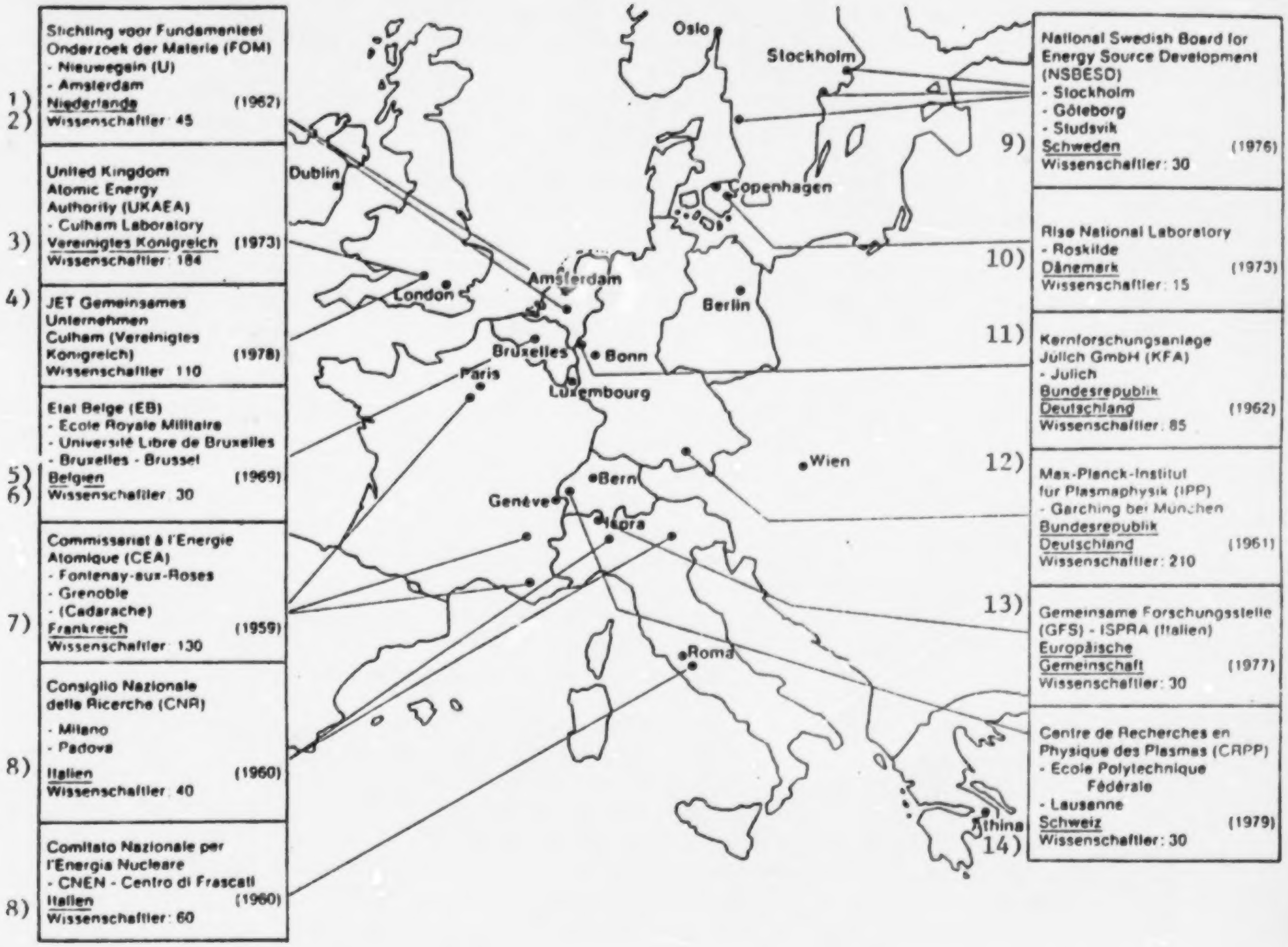

1)
2)
Stichting voor Fundamenteel Onderzoek der Materie (FOM)
- Nieuwegein (U)
- Amsterdam
Niederlande (1962)
Wissenschaftler: 45
3)
United Kingdom Atomic Energy Authority (UKAEA)
- Culham Laboratory
Vereinigtes Konigreich (1973)
Wissenschaftler: 184
4)
JET Gemeinsames Unternehmen Culham (Vereinigtes Konigreich) (1978)
Wissenschaftler 110
5)
6)
Etat Belge (EB)
- Ecole Royale Militaire
- Université Libre de Bruxelles
- Bruxelles - Brussel
Belgien (1969)
Wissenschaftler: 30
7)
Commissariat à l'Energie Atomique (CEA)
- Fontenay-aux-Roses
- Grenoble
- (Cadarache)
Frankreich (1959)
Wissenschaftler: 130
8)
Consiglio Nazionale delle Ricerche (CNR)
- Milano
- Padova
Italien (1960)
Wissenschaftler: 40
8)
Comitato Nazionale per l'Energia Nucleare
- CNEN - Centro di Frascati
Italien (1960)
Wissenschaftler: 60
Oslo
Stockholm
Dublin
Copenhagen
Amsterdam
London
Berlin
Bruxelles
Bonn
Paris
Luxembourg
Wien
Bern
Genève
Ispra
Roma
Athina
9)
National Swedish Board for Energy Source Development (NSBESD)
- Stockholm
- Göteborg
- Studsvik
Schweden (1976)
Wissenschaftler: 30
10)
Risø National Laboratory
- Roskilde
Dänemark (1973)
Wissenschaftler: 15
11)
Kernforschungsanlage Julich GmbH (KFA)
- Julich
Bundesrepublik Deutschlang (1962)
Wissenschaftler: 85
12)
Max-Planck-Institut fur Plasmaphysik (IPP)
- Garching bei Munchen
Bundesrepublik Deutschland (1961)
Wissenschaftler: 210
13)
Gemeinsame Forschungsstelle (GFS) - ISPRA (Italien)
Europäische Gemeinschaft (1977)
Wissenschaftler: 30
Centre de Recherches en Physique des Plasmas (CRPP)
- Ecole Polytechnique Fédérale
- Lausanne
Schweiz (1979)
Wissenschaftler: 30
14)

Figure 1: Sites of Fusion Laboratories in Europe

Key:
1. Netherlands
2. Scientists
3. United Kingdom
4. JET joint und[illegible]king
5. Brussels
6. Belgium
7. France
8. Italy
9. Sweden
10. Denmark
11. Juelich Nuclear Research Facility GmbH (KFA), Federal Republic of Germany
12. Max Planck Institute for Plasma Physics (IPP), Garching near Munich
13. Joint Research Center (GFS) - ISPRA (Italy), European Community
14. Switzerland

Table 1: The Most Important Tokamaks in Europe

Initial operation	Apparatus	Present and future primary aims	Plasma current (kA)	Pulse duration (sec.)
1973	TFR (Fontenay)	Plasma heating, physics	400/600	1
1976	DITE (Culham)	Divertor, heating, physics	250/350	0.5
1977	FT [Frascati Torus] (Frascati)	Scaling laws, high-frequency heating	1000	1
1980	ASDEX [Axial-symmetrisches Divertor-Experiment] (Garching)	Divertor, heating, fuel replenishment	500	5
1981	TEXTOR [Torus-Experiment fuer technologisch orientierte Forschung] (Juelich)	Interaction of plasma and wall	500/600	3
1983	JET	Scaling laws, heating, interaction of plasma and wall, alpha particles	3800/4800	5/13

The technological part of the fusion program (about 7 percent of the total budget) is devoted almost entirely to the tokamak, with it being oriented primarily to the requirements of those installations which will come after JET. International cooperation (with non-European countries) has brought some early concrete results in certain areas of technology and in connection with the systems studies (INTOR).

On the whole, the panel makes a favorable assessment of the results of the European program and the success of the Commission's coordination activity. However, it is of the opinion that in consideration of the transition from the more scientific to the technological phase of the fusion-research program, a few shifts in emphasis are advisable, and that in the longer term an organizational streamlining of the program must take place.

In particular, the following notes were made in this connection:

- The comparatively narrow basis of the present European program involves a certain risk, although this is offset in part by international cooperation.

- Even though the plasma-physics aspects of the fusion program are well provided for, there is already a considerable lag in the likewise important fusion-technology program. In particular, not enough attention has been devoted to the systems aspects in connection with operation and maintenance.

- Although in some laboratories there are contacts between fusion research and research and development in the field of nuclear fission, nevertheless these contacts are neither frequent enough nor sufficient in scope.

- The European program is small in the sector of inertial confinement; it does not even allow as yet an adequate evaluation of work being done in other parts of the world.

- In those cases where research under way in smaller laboratories has not yet been integrated into larger programs, the efficiency of this research has decreased in the same measure as the main programs at the larger institutions have increased in size. On the other hand, because of their links with the advanced schools, the small laboratories are providing an effective training for young scientists.

3. Recommendations for the Future Program

The panel is convinced that Europe must remain in the front line of fusion research, and therefore it recommends a steady continuation of the European fusion program. The work being done on proving scientific feasibility must be continued, and new projects for the demonstration of technical feasibility must be begun. The main goals of the program for the coming decades must be the proof of the feasibility of fusion as an energy source and the search for optimal ways to fully utilize its potential.

On the Program Strategy, the panel recommends (Figure 2):

- a further developing of the tokamak system within the framework of a substantial program directed towards a demonstration reactor, and the executing of the initial phase of this program (the JET project along with its development stages) as well as the executing of programs in support of the tokamak confinement system;

- the stepping up of development work on the technology required for the construction of the second stage of the tokamak program (Next European Torus, NET), with this work being oriented toward concept-design studies;

- an investigating of alternative confinement systems applicable to reactors, preferably in cooperation with other fusion programs around the world and above all the program of the United States;

- critically examining, toward the end of the 1980's, the results of the JET and of similar experiments which are being performed elsewhere, and then coming to a decision on whether the construction of the second stage of the tokamak program should be started on.

In parallel with these activities, systems studies for fusion reactors should be carried out in order to continuously evaluate the progress achieved and to make it possible to continue to orient the program toward its final objective, the demonstration reactor (DEMO). As concerns the employment of the funds available in the Community, about 80 percent should be used for the first two parts of the program specified above, and a maximum of 15 percent for the third part.

As for the JET Project, the panel recommends the speedy executing of the first three phases of the JET program, so that JET can reach full power as soon as possible, and furthermore the preparing of JET for D-T operation. A decision to inject tritium into JET will have a very strong effect on the program strategy and should be thoroughly discussed at the proper time. The associated laboratories should be encouraged to participate more extensively in the construction and operation of JET.

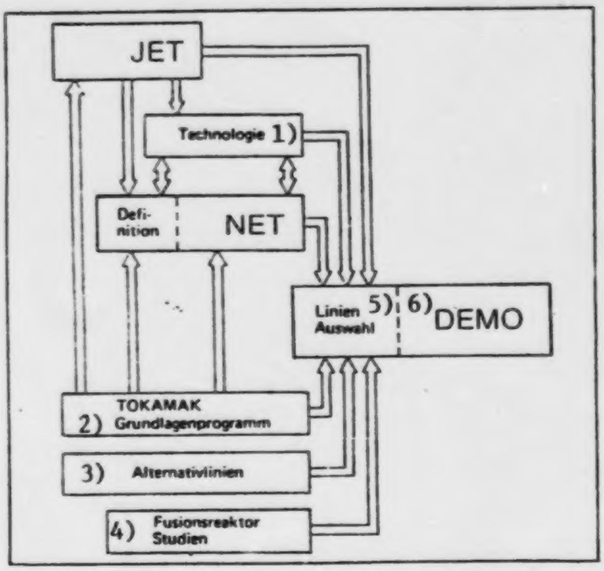


Figure 2: Elements of the Program Strategy

Key: 1. Technology
2. Basic program
3. Alternative systems
4. Fusion-reactor studies
5. Systems selection
6. Demonstration reactor

On NET and the Technology Phase, the panel recommends the following:

- the commencement of a substantial and well-balanced program on fusion technology which is aimed above all at solving technological problems of the NET and in the execution of which the experiences gained in the technology of fission reactors is used. Focal points of such a program should lie in the areas of superconducting coils, tritium handling, remote control, breeding blankets, materials, and safety and environmental aspects.

- the intensification of work on concept designing for an apparatus belonging to the next stage and work on solving the associated problems by means of the establishment of a NET study group;

- the establishment of a steering committee for fusion technology on a high level which can advise the Commission with respect to the activities at the second stage--that is, the NET study group and the technology program.

As for the General Tokamak Program, the panel recommends that the trend be continued toward a concentration of work on newer and larger tokamaks. Three new specialized tokamak projects (Table 2)--which are at different planning stages--

are definitely justified from the point of view of program strategy, and the panel recommends the execution of these projects.

Table 2: New Tokamak Facilities

Facility	Tasks	Planned initial startup
TORE SUPRA (Cadarache)	Superconducting coils - long-pulse physics - heating - investigation of the diffusion of impurities	1986
FTU (Frascati)	Scaling laws (high n), resonance heating in the lower hybrid region	1985
ASDEX UPGRADE (Garching)	Poloidal divertor outside the toroidal field coils - cold plasma jacket - monitoring impurity diffusion - noninductive plasma current	1988

With respect to the Alternative Magnetic Confinement Systems, the panel recommends that Project RFX[4)] and the two-stage development of the advanced stellarator be carried out. The participation of the United States in both programs is planned. Since the Community is not carrying out any work on mirror machines, it should actively keep track of the extensive mirror program of the United States by sending personnel to observe it and possibly by supplying components or taking on certain tasks.

With respect to Inertial Confinement, the panel recommends that work in this area be continued only to the extent necessary to keep track of the advances achieved in other places, without striving for competitiveness on an international level. To this end, it is essential:

- to attend to certain basic problems in connection with inertial confinement on a small scale, although on a somewhat larger scale than hitherto;

- to effectively coordinate the limited activities within the associations and keep as wide open as possible the chances for cooperation with laboratories within and outside the Community;

- to keep track of the advances achieved in other programs around the world.

At present, the panel does not recommend any development program oriented specifically towards Fusion-fission Hybrid Systems. Instead, these systems should be re-evaluated from time to time within the framework of systems studies.

The panel regards the employment of funds by the Commission at the level of about 1,500 million ECU (1981 prices) for the period 1982 to 1986 as reasonable in view of the necessary expansion of the program, and it recommends to the competent authorities that they approve of this appropriation. The panel places particular emphasis on the need to support JET and on commencing the program of NET technology.

The panel is of the opinion that outlays at this level, which correspond to about 0.6 percent of the current annual total outlays by Europe for research and development and to 0.3 percent of its present annual outlays for fuel and electricity imports, are justified on the grounds of the significance of the long-range potential of fusion for Europe's energy supply, and also because of the scientific value of the program as well as its stimulating effect on European industry. These expenditures are lower than those of the more ambitious program of the United States, and they even lie below--on a per-capita basis--the outlays in connection with the Japanese program. Nevertheless they are probably sufficient to maintain Europe's competitiveness and to put it in a position such that it can negotiate agreements on cooperation and on an exchange of information with the other partners--something which will become more difficult as soon as fusion enters into the technological phase.

Although the NET studies and the technology program could begin on a high level within the framework of the existing Management Structures and with the incorporation of the recommended steering committee for fusion technology, consideration should be seriously given to the alternative of putting the whole fusion program under a single management structure in the future--a system which is geared better to the coming technological phase of the work and to the effecting of major projects.

The panel recommends the further improvement of cooperation among the associated laboratories as well as with JET and NET. Participation in major projects of other laboratories should become a significant component of the programs of all associations, above all the smaller ones. The financial inducement in encouragement of such participation should be increased. Support for JET and for NET technology should enjoy the highest level of priority in the programs of all the associations.

The panel recommends working towards the goal of getting industry involved at an early stage of the NET-technology program. European industrial undertakings should be brought into the NET-technology program as consultants and suppliers for systems project work. Whenever possible, industry should be involved in the planning and development of advanced components. The exchange of personnel between fusion laboratories and industrial firms should be promoted.

The panel endorses strengthened international cooperation with all other fusion programs in the world. In particular, it emphatically recommends that cooperation continue with the United States, the USSR, and Japan on the INTOR project. In the area of alternative confinement systems, cooperation with the American program is of particular importance; this cooperation should be founded on the complementarity of the European and American programs. The already initiated cooperation in the field of fusion technology should be extended to other areas, and above all to the large installations of the next generation--FED, FER, and NET.

The problems of controlled nuclear fusion represent a great challenge for science and engineering. An appropriate solution is doubtlessly possible only within the framework of close European cooperation. But at the same time, the potential of this energy source offers a great chance to Europe.

FOOTNOTES

1) Members of the European Fusion Review Panel: Dr J. B. Adams, CERN [European Organization for Nuclear Research]; Prof C. Bernardini, Rome; C. Bienvenu, EdF [Electricite de France]; J. R. Goens, Eurodif/CEN [Centre d'Etude de l' Energie Nucleaire], Prof H. L. Jordan, DFVLR [German Research and Development Institute for Air and Space Travel]; Sir John Hill, BNFL [British Nuclear Fuels Ltd.]; L. H. Rey, Stockholm; Prof G. Stoppini, Pisa; Prof J. Teillac, CEA [Commissariat a' l' Energie Atomique]; Prof H. G. von Bueren, The Hague/ Utrecht.

2) Report of the European Fusion Review Panel; Brussels: June, 1981, EUR-FU BRU/XII-715/81.

3) The complete utilization of all proved minable resources for both lithium isotopes would yield $3 \cdot 10^{13}$ t of ROeE, but probably only about 10 percent of this is truly accessible. If lithium could be recovered from sea water (0.17 g/t), this figure would increase to $3 \cdot 10^{16}$ t of ROeE.

4) RFX = Reversed Field Pinch; meanwhile, the UKAEA [United Kingdom Atomic Energy Authority] has withdrawn its proposal on setting up this experiment in Culham.

12114
CSO: 5100/2141

DEVELOPMENT OF FIRST NUCLEAR HEATING PLANT REPORTED

Warsaw RZECZPOSPOLITA in Polish 31 Mar 82 p 3

[Interview with Prof Jerzy Minczewski, Government Plenipotentiary for Atomic Matters, by Krzysztof Szczesniak; date and place not specified]

> [Text] At its previous session the Sejm enacted a law on the creation of the State Atomic Agency. We turned to Prof Jerzy Minczewski, the Government Plenipotentiary for Atomic Matters, for more detailed data concerning this important legal act and for a discussion of the problems typical for this branch of science and technology.

[Question] Professor Minczewski, couldn't we have gotten along without the existence of the agency, and where did the idea arise to form an agency, and not an office, or a bureau, as has been the usual thing in our country?

[Answer] To tell the truth, I am unable to describe the basis for this very well. This is exclusively a question of legal terminology. All in all, we acted in conformity with the wishes of the community of Polish atomic physicists concerning the establishment of an Office for Atomic Matters. It turned out differently, and probably turned out for the good. Because of this kind of official solution, the representatives of ministries and scientific institutions connected with atomic matters will become part of the board of the agency. What are the advantages coming from that? We will have an influence on the initiation and implementation of technical and scientific concepts, and vice versa, the ministries will be able to adapt the direction of the work of atomic specialists toward their own needs through their own representatives in the agency's board.

[Question] Well good, so please answer me: why does the agency not include within the scope of its activities the problems of the Polish nuclear power industry, which, pursuant to the aforenoted law, remains under the control of the Ministry of Mining and Power Industry?

[Answer] In all countries where there are nuclear power stations, they are subordinate either directly to the concerns that operate them, or to a ministry for power industry matters. In addition to this, there are state institutions of the same type as our agency, that have the right, and not only the right, but even the obligation to supervise and inspect them. They issue licenses for the startup of electric power stations, after having first checked out whether nuclear safety has been assured. That way, there is two-fold supervision: that of the ministry of power industry and the external one--that of the agency. The International Atomic Energy Agency in Vienna recommends such a solution, and we are abiding by it.

[Question] So what has come out of it...? To date, the construction of the nuclear power station in Zarnowiec has not gotten off the ground. I doubt whether the institution of the agency will accelerate the construction.

[Answer] Undoubtedly, a look into the matter of progress of this construction project will have to be one of the duties of the agency. I consider that we, with both our scientific facilities and our status, will help the Ministry of Mining and Power Industry to accomplish these construction projects as well as possible. The adoption by the Council of Ministers of the decree on the construction of the first nuclear unit proves that the country's leadership is convinced that without a nuclear power industry, there is no other way to go, there is no other way to bridge the energy gaps in industry.

[Question] Certainly, won't this gap be filled also by the "atomic law," which the agency is supposed to draw up?

[Answer] Of course, but I do not know whether you know that in Poland, we do not have a unified law that would regulate radiological protection and nuclear safety. There is a whole gamut of scattered legal acts that set standards in part for these questions, as concerns component standardization and checking. In addition to this, we have to work up new solutions in this field. I will say, as an example, that in the light of the current instructions, there are no legal bases for putting a nuclear power station into operation in Poland(?). I hope, that the "atomic law" draft, which is nearly ready now, will still get to the Sejm this year.

[Question] Polish atomics has many achievements to its credit, however, recently, we haven't been hearing much about it. Have we fallen behind relative to other countries?

[Answer] To a large degree, these are only the external manifestations of the existing state of affairs. Although it is true that during the last 10 years there was a lack of money for industrial implementation. Therefore, there are developments that are awaiting producers, and certain installations are being produced in small quantities. However, our scientific facilities worked productively during the entire time, and we did not lose anything in the way of scientific potential. For example, the "Neptun 10P" 10-MeV electron accelerator for tumor treatment, produced in cooperation with the French firm CGR-MeV, has been exported to the GDR and to other countries.

In a year, we will produce: the "Linel 4MX" 4 MeV therapeutic accelerator, which has been already developed completely by us, and can be used in place of cobalt bombs. The Institute of Nuclear Research is in the process of supplying a neutron spectrometer and a diffraction meter to Libya, where an atomic center is being constructed, and we are a supplementary supplier for it. We have put nuclear equipment and installations into series production by the Polon Plant. This production provides for the most vital needs of the country and is an important export item.

We are producing radioactive isotopes for medicine and industry, and the tagged compounds with these isotopes. In addition to this, there are many original developments in the application of nuclear techniques and radiation technology that have been implemented in industry. Under the new conditions of economic reform, we have the hope that we will succeed in acquiring coproducters, without whom, in view of our own weak production capabilities, we are incapable of increasing production. The same is true for export. I will add that our current activity is 90 percent directed toward import replacement.

However, we have stayed behind, are left in the dust, it's true, as far as nuclear power is concerned. Poland is the only socialist country without an atomic power station. What more can we add? And as for a nuclear heating plant? I am convinced that a decision has to be adopted right now in this matter, and the country's first heating plant based on nuclear fuel has to be built parallel with the electric power station in Zarnowiec. All the more so in view of the fact that we can build it and equip it within our own capacity. We have already worked up a conceptual plan for it. Only the fuel would be imported from the USSR. It is simply a pity to continue to waste precious coal for heating.

[Question] That is right. Except for the fact that in our difficult economic situation, these plans appear to me to be destined for some future day?

[Answer] I am fully aware of the economic situation in which we find ourselves today. Please remember, however, that in the field I represent, we are working, not for today, nor for 2-3 years in the future, but with a lead time of 20-30 years. If we neglect today even that backwardness that has accumulated over the years, I do not know if it will be possible to make up for it at all.

I hold before me the bulletin of the International Atomic Energy Agency. According to world data, for every monetary unit of investments carried for the development of nuclear technology, an economic effect of from 3 to 30 times is gained. In our conditions, if thermal-contractile pipes are concerned, this effect is perhaps 1 to 100. Nuclear technology, as can be seen, brings collossal profits. The mission of the State Atomic Agency will algo be, among other things, to inculcate this awareness into domestic industry and what comes after this is the setting into action of the scientific potential of Polish atomics, which has been moribund up to now because of a lack of interest.

[Question] Then, we await the beginning of the activity of the agency.

[Answer] I think that that is a question of several days. The executive orders have to appear, a president of the agency has to be appointed, and... then we shall set about our activity.
5808
CSO: 5100/3016

BRIEFS

URANIUM PRODUCTION SUPPORTED--The Tunisian chemical company Societe Tunisienne des Industries Chimiques Maghrebines and the French firm Uranium Pechiney Ugine Kuhlmann plan to produce uranium at the Tunisian town of Gabes, it was reported from Paris last week. Construction of the factory will start next year and it is due to begin producing an annual 132 tons of uranium in 1985. The uranium will be separated from waste products through a process involving phosphoric acid, a spokesman for the French company said. [Text] [Paris AN-NAHAR ARAB REPORT & MEMO in English No 15, 12 Apr 82 p 5]

CSO: 5100/5007

SPD REJECTS MORATORIUM ON NEW NUCLEAR POWER PLANTS

Frankfurt/Main FRANKFURTER ALLGEMEINE in German 23 April 82 p 3

[Article: "Moratorium on Construction of Nuclear Power Plants Rejected. SPD Congress Resolution. No Approval for Government's Energy Policy. Success for Ehmke"]

[Text] The rejection of a moratorium on the construction of new nuclear power plants by the SPD congress at Munich does not mean that the SPD supports the Federal Government's energy policy. While the government in its energy programs favors the increased use of nuclear power to cover basic needs for production of electrical current (i.e. in continually on-line power plants assuring basic output), the SPD feels it is important that even in the future, the basic question of a decision for or against the long range use of nuclear power should remain open. The Munich party congress did confirm the older party congress resolutions, according to which nuclear energy should be used only to cover a deficit that could not be met by the use of coal-fired plants.

The party executive had proposed in its resolutions that additional nuclear power plants could be built "only in terms of need." Such a formulation would have left the Federal Government with more latitude, because the need will also be determined by the cost differential between nuclear and coal-fired production, where nuclear power has the edge. Now, however, the party congress has resolved that new nuclear power plants can only be built "in accordance with existing party congress resolutions." The earlier resolutions allowed the construction of new nuclear plants only if the need for electrical current could be covered in no other way. The SPD has thus left Schmidt no greater latitude in his energy policy. Eppler pointed out at the party congress that under the previous resolutions no nuclear power plants could be allowed because the demand for current had not increased and there were already redundant power production capacities.

During the debates at the party congress, Hesse's Minister-President Boerner and the chairman of the miners union, Schmidt, spoke out for the Federal Government's energy policy and for the cautious expansion of nuclear energy. Boerner pointed out that because of protracted legal processes over the next two years there would be little likelihood of construction of new nuclear power plants being begun. If the party congress wanted to vote in favor of a moratorium they would only be making the SPD's task of governing in Hesse the harder.

Trade union leader Schmidt warned against a moratorium by pointing out, among other things, that the SPD would, by taking such action, be cutting back on the alliance between the party and the German Trade Union Federation "slice by slice." A 2-year moratorium would only bring the SPD "grief and loss of confidence" and create insecurity in the country. Workers in the coal and steel areas also needed the stimulus to employment that would follow from a reasonable energy policy. In the Ruhr and in the Saar there were already problems enough, said the union chairman. The SPD ought not to commit itself to an "either/or" policy but to "one as well as the other," that is, to an integration of coal and nuclear energy. Priority in energy production should go to domestic coal. If there were redundant capacities, then limits should be set on the use of oil, gas and imported coal. Coal would not suffer from a cautious expansion of nuclear power, said Schmidt, who also urged the construction of the high-temperature reactor, through which the use of coal could be made environmentally more compatible. Schmidt received the largest round of applause from the delegates. From this approval and in the course of the voting it became clear that Chancellor Schmidt's energy policy was favored primarily by the delegates from North Rhine-Westphalia and the trade unions.

Opponents of an expansion of nuclear energy were, in particular Matthiesen from Schleswig-Holstein, and Eppler. Eppler was in favor of the moratorium because it would bring a compromise beteen the various views held within the party and would leave a definitive decision open. Eppler remarked that it was the goal of the electrical power industry "to stage down the base load range of coal-fired power plants to an interim load stage" through the construction of nuclear power plants. The SPD had taken the position that nuclear power plants could only be built when demands could no longer be met by coal-generated current. It would be contradictory to want to build nuclear power plants if these, under certain circumstances, could not be tied into the power grid.

The line of the petitions committee, to which Eppler assented, did not succeed in the balloting. A motion of Matthiesen was defeated, which aimed at a prohibition on the construction of nuclear power plants until 1990. Another motion calling for funds to be made available for the development of alternative power sources on the same scale as those for nuclear energy, was voted down by only a small majority. A motion made by deputy floor leader Ehmke to table the moratorium proposal found a sufficient though small majority. Ehmke expressed the view that the question of whether nuclear energy ought to be used in the more distant future in the Federal Republic was not yet ripe for a decision.

9878
CSO: 5100/2152

HAMM HIGH-TEMPERATURE REACTOR BESET BY FINANCING PROBLEMS

Hamburg DER SPIEGEL in German 4 Apr 82 pp 50, 53

[Text] FRG reactor construction is ruining state finances. The costs of the high-temperature reactor in Hamm are reaching breeder dimensions.

The contract was so modestly drafted that it could have been drawn up by Franciscan monks.

The contract partners, the High-Temperature Nuclear Power Plant Co (HKG) and the Manufacturers Consortium, committed themselves to building the 300 megawatt [MW] thorium high-temperature reactor (THTR 300) "within the framework of cautious fiscal management as economically as possible according to the principles of technical-economic, reasonable operation."

The plant in Westfalian Hamm-Schmehausen was to be completed smoothly, within 5 years. And the cost of DM690 million sounded favorable, like a special offer.

When today, after a good decade of construction time, Klaus Knizia, president of the third-largest FRG power producer, United Electricity Works Westfalia Ltd (VEW) and HKG business manager, comes to speak of the costs of the new reactor type, the balance sheet looks neither economic nor reasonable.

For the most recent data, which Knizia's managers have now calculated internally, could introduce a third big financing scandal about a gigantic construction project in North Rhine-Westfalia, comparable to the cost debacle of the large clinical complex in Aachen which is to cost DM2 billion instead of DM550 million, and the fast breeder in Kalkar for which DM5.9 billion are now estimated (DM1.7 billion during planning).

According to statements by the operators, the reactor in Hamm will "in no way" be completed "before October 1985," instead of in 5 years, thus, at the earliest in almost 14 years. And, "as viewed today" the "current total costs" are six time as high as originally planned: DM4.22 billion. Whether this amount then will actually be enough, "naturally cannot be predicted with full accuracy."

Everything about it had seemed to be so problem-free when the 15-MW prototype was put into operation in 1966 in the Juelich nuclear research plant. The Ministry for Research in Bonn and the Land North Rhine-Westfalia quickly agreed to jointly finance the construction of a 300-MW THTR.

For Reimut Jochimsen, minister of economics in North Rhine-Westfalia, the "concentrated power plant" on the eastern edge of the coal region today still seems to be the "ideal model" for solving North Rhine-Westfalia's economic problems--"the great opportunity to make optimal use of our coal resources with the help of nuclear energy."

Performance and safety of the new reactor type had impressed Jochimsen from the very beginning. While light water reactors, thus all nuclear power plants currently in operation in the FRG except for Juelich and Karlsruhe, can heat their automatic water return as high as 350°C, in the case of the THTR the inert gas helium instead of water is heated up to almost 1000°C by the nuclear chain reaction.

Thus, the high-temperature reactor can be used not only to generate electricity, but also to supply process heat as in the case of coal transformation, or to supply long-distance heat.

And the THTR is also supposed to be safer than other nuclear power plants. While in the case of the light water reactor the worst conceivable accident could result in the melting of the reactor core and in the worst damage to the environment, with the reactor in Hamm melting of a multiply-encased, tennis-ball shaped fuel element of uranium and thorium is hardly possible according to the operators' representation. The radiation load from the reactor is no greater at the fence of the power plant of a THTR than that from a television set--1 millirem per year, a fraction of that which accumulates in the way of a radiation load in a concrete house.

The operators do not know how to explain why the "safe and problem-free plant" (HKG) has not yet been completed. For 6 years completion of construction has been predicted, always with a constant schedule: 3 and one-half years prior to starting operation. Since 1976 the nuclear managers had presented a higher final cost six times; in January of this year DM2.76 billion. If the rates of increase are extrapolated to 1985 there would be a total of nearly DM8 billion.

The fact that success with the long overdue building eludes the construction sponsor, the manufacturers, two participating Federal and three Land ministries is attributed by conglomerate managers to the size of the power plant which apparently overtaxes the parties involved.*

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*The following are involved in the THTR 300: As construction sponsor the High-Temperature Nuclear Power Plant Ltd (partners: Weser Community Power Plant Ltd, Veltheim; Hattingen Community Plant Ltd, Hattingen; Mark Municipal Electricity Plant Co, Hagen; Aachen City Works Co, Aachen: Bremen City Works Co, Bremen; United Electricity Works Westfalia Co, Dortmund); as the manufacturers consortium these companies: High-Temperature Reactor Construction Ltd

A high ministerial official in the Bonn Ministry for Research confesses that "in view of the 50 partial permits so far none of us sees his way completely clear." In this connection, about 60 TUeV [Technical Control Board] certificates and 10 partial permits are still outstanding. Six lawsuits are in progress, there can be others.

Of 1,400 conditions which were demanded by the Land government with the partial permits issued to date, the builders have satisfied only 500; the rest "is work for years" (according to an engineer at the construction site). Several hundred conditions have "proved to be so abstruse," say a managing staff worker of the manufacturers consortium, "that we simply cannot meet them." With new partial permits 500 additional conditions are pending.

HKG manager Knizia explained what is actually slowing things down: just for the construction of pipelines in the reactor hall 38,000 production plans and 88,000 individual documents were required which were covered with 397,000 signatures and 770,000 stamps. The test documents for 1,700 holding device designs fill 7,000 files. The documentation with the TUeV papers alone for the steam circuit covers 190,000 pieces of paper and weighs 41.2 tons.

Supply companies tried to exploit the gigantic paper floor for increasingly higher price demands. Because "the basic business conditions no longer exist" they cancelled the originally agreed upon fixed prices and since then have been insisting on payment according to time--a bottomless pit and uncontrollable. The money demands of the companies almost drove the HKG into bankruptcy last year: for months the power producers were unable to pay. Yet that need not have concerned the reactor operators very much: additional costs and losses are borne almost entirely by the state. Per contractual agreement, the Federal and Land Governments took over the

--"research and development pertaining to construction" during the construction period and the demonstration operation up to 100 percent, follow-up development costs from 70 to 90 percent;

--investment subsidies amounting to 66.7 percent (because the THTR is a demonstration plant), in addition 7.5 percent supplementary investment allowance.

Almost a trick not always to get the government to pay for it. Moreover, the six associates of HKG had succeeded before in doing this: according to the contract they contributed a total of only DM600 million in the way of self-financing of the THTR in Hamm--with the argument, expressly approved by

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* in Mannheim, Brown, Boveri and Co in Mannheim, Nukem Ltd in Hanau; as nuclear law supervisory authorities the North Rhine-Westfalian minister for labor, health and social affairs and the Federal minister of the interior; as the licensing authority the North Rhine-Westfalian minister of labor and the North Rhine-Westfalian minister for economics; as financiers the Federal minister for research and the North Rhine-Westfalian ministers for econmics and finance.

the Federal minister for research, in the construction of a comparable light water reactor they would get by with DM600 million; for innovations beyond that the state is responsible.

If possible the HKG will pay only DM50 million of the DM600 million. For DM510 million of the DM600 million are foreign funds which the state guarantees, without the electricity plants having declared themselves prepared to assume responsibility for this amount vis-a-vis the state. The rest of the DM90 million is its own capital, of which the HKG needs to pay only DM40 million if the test runs of the finished plant are successfully concluded.

The operators are even better off if there are no test runs at all. Then the risk-participation contract takes effect which the HKG concluded with the Federal minister for research and the North Rhine-Westfalian minister for finance. Key point in the 1971 agreement: the national government and the Land North Rhine-Westfalia will by and large assume any losses in operation as well as in shutting down the THTR 300.

Things could come to that point. For whether the THTR 300 will ever produce electricity in a way that covers costs is disputed among the experts. German industrial chemistry for which the project is supposed to be of special use thus far has appeared cool.

HKG boss knizia for the moment at least is allowing no doubts. He speaks of the 450-MW high-temperature reactor which is supposed to be far more usable than the THTR 300.

In March Knizia let North Rhine-Westfalia Minister of Economics Jochimsen know that the 450 will not exist until the THTR in Schmehausen has run for 2 years.

The sign is clear: The state is to continue paying.

12124
CSO: 5100/2143

REORGANIZATION OF ATOMIC ENERGY COMMISSION ANNOUNCED

Paris LE MONDE in French 20 Apr 82 p 11

[Article by Jean-Francois Augereau: "The Atomic Energy Commission Is Going to Be Reorganized"]

[Text] The Atomic Energy Commission (CEA) is to be reorganized soon. The organism's top administration has indeed been working for some time on a proposal for new structures which, after being submitted to the ministries concerned--Industry, Scientific Research and Technology, Defense--and to the tel Matignon, will shortly be presented to the trade-union organizations. The proposed reorganization will then, after possible amendments, be submitted to the Atomic Energy Committee, by 13 May at the earliest, or 10 June.

In order to understand what the proposed modifications of the CEA's structures and plan of organization are in the present state of thinking, which is not definitive, one must refer them to the situation as it was at the end of 1970, after the Giraud reform was instituted. To make an extreme simplification of matters, it appeared that the general administrator was surrounded by a general staff of 10 persons, including 7 deputies responsible for seeing to it that the activity of the CEA's operational units corresponded well to the mission nuclear materials, industrial applications of nuclear energy, military applications, etc--for which each was responsible.

On this basis, each deputy therefore had to define a policy corresponding to the mission for which he was responsible and see that it was applied, with each operational unit being responsible for application of this policy as well as for for putting the corresponding means into action. In addition, the Commission's organization comprised a central administration and central services, responsible for the various administrative, financial and technical sectors, and the famous operational units, whose nuclear-studies centers are still privileged territories.

Twelve years later, the structure in place is, overall, the same. But some play has developed in certain cogs and drive belts, while various internal adjustments have brought some changes: such is the case with the post of deputy for nuclear materials, whose function has been somewhat modified by the fact of the creation of the Nuclear Materials General Company (COGEMA), a 100-percent subsidiary of the CEA; the same is the case with the mission of the deputy responsible for safety problems, with the setting-up of the Institute for Nucelar Protection and Safety (IPSN). But beyond that, it is the very existence of the deputies that appears to be brought into question by the proposed reform of the CEA. Some appear to think that the system is somewhat vitiated in this area, resulting in the deputies' being made a sort of "super-directors" with excessively hierarchical behavior vis-a-vis the operational units. These latter, though originally intended to operate on the credits of different divisions, actually soon found themselves under the thumb of a single man.

For this reason, the proposed reform therefore aims to eliminate the deputies and regroup the operational units into larger entities, with their own means and a certain financial autonomy, to be defined. These entities, formed in the image of the institutes already existing in the CEA--the IPSN and the Institute of Fundamental Research (IRF)--could be four in number: first of all, the IPSN and the IRF. The latter would become a true institute and would no longer be the simple "federation" that it is today. To them would be added the Directorate of Military Applications (DAM) and an institute responsible for the applications of research, and some do not rule out the possibility of its being broken up into subgroups for electronuclear applications, isotopic separation, metallurgy, medical activities, electronic components, innovation and industrial research, etc.

To this vertical structure, placed under the authority of the general administrator (and to which should be added--to be complete--the activities of the subsidiaries, which have great autonomy of action), there should be "grafted" a permanent structure making it possible, in a certain way, to ensure the coherence of the CEA group, with all the institutes and subsidiaries together. In this domain, there could be set up a general secretariat, a sort of general superintendent responsible for administration, a division of industrial strategy, a programs and planning division to ensure the evaluation function--which some consider was done after the fact, whereas the credits were given before the fact--a social-relations division and a division of international relations.

What it in fact involves is the setting-up of a simpler mechanism, a top administration with limited staff and more dynamic means of action, and perhaps also the encouragement of a certain decentralization, which some measures taken in 1980 did not totally succeed in bringing about, while at the same time making the best use of the formidable reservoir of scientific and technical knowledge and know-how that the Commission constitutes.

This reorganization will perhaps require, in addition to the structural reforms, a minimum infusion of new blood. Should one view the rumors that suggest that Gerard Renon, presently technical adviser to Francois Mitterrand, could become assistant general administrator of the CEA, working with Michel Pecqueur, as a first sign in this direction?

Nearly 30,000 Persons

The CEA group taken as a whole--that is, including all subsidiaries--comprises nearly 30,000 persons. Of this total, a little more than 18,000 belong to the

Commission as such, and about half of these are employed by the Directorate of Military Applications (DAM). One could say, in a schematic way, that the CEA group is composed of three branches with staffs nearly equal in number: the subsidiaries, with almost 10,000 persons, including 8,600 in the COGEMA and nearly 1,000 in the CISI [expansion unknown], a data-processing services company; the DAM; and the rest.

The resources, not including those for the activities particular to the subsidiaries--essentially the COGEMA and the CISI--presently total a little more than Fr 13 billion, half of which is provided by credits from the Ministry of Defense. The balance is composed of Fr 5.26 billion in subsidies for the other programs and Fr 1.6 billion in the CEA's own receipts, one-third of which--about Fr 500 million--comes from the innovation and industrial-development sector, and a considerable proportion--Fr 240 million--from the electronuclear sector.

11267
CSO: 5100/2150

BRIEFS

ANTI-NUCLEAR MARCH, CAMP-IN--The arrival in Paris of the participants in the march against the Super-Phenix breeder reactor, who had set out from Creys-Malville (Isere) 3 weeks ago, was met with almost total indifference. On Saturday evening they attempted to be received at the Elysee, where they were advised to address themselves to the Ministry of Energy. There was disappointment, in Place de la Nation on Saturday afternoon, for the 20 antinuclear militants at the conclusion of their march against Super-Phenix. For 3 weeks they traversed France, at the rate of 25 km per day, meeting only with indifference from the population, or at best, sympathetic curiosity. In Paris, though, several hundred persons joined with them, including several young people who had at it with the photographers and with Brice Lalonde. In the demonstrators' view, one of the reasons for this setback is lack of information: "The people are not informed," explained one of the marchers; "some believe that Super-Phenix is already in operation." At each way-point, the local collectives organized information meetings "against the plutonium society." The marchers, who were always welcomed into local residents' homes, also met with local elected officials. "These officials," the antinuclear people consider, "have voted without understanding anything, and their votes have legitimized the behavior of EDF [French Electric Power Company]." While the antinuclear people are perfectly aware of the fact that their movement is a fringe one, and of the violence of their toughest elements, they consider that the march has at least made it possible to revive interest among local ecologist groups and to prepare for better coordination of the movement. On the left and on the right, nuclear power represents the same danger in their eyes, even if since 10 May an increasingly broad segment of public opinion seems to accomodate itself to it. In this area, they consider that the Socialists have betrayed their promises. That is why a delegation of militants went to the gates of the Elysee on Saturday evening, determined to camp there if necessary until Francois Mitterrand's return from Japan. [Text] Paris LE MATIN in French 19 Apr 82 p 16] 11267

NO NUCLEAR POWER PLANT FOR BRITTANY--No nuclear power plant for Brittany--at least not between now and 1986. This is what the minister of energy, Edmond Herve, reaffirmed to the Socialist militants of Morbihan. On the other hand, the region will be given a coal-fired thermal power plant, and the 400,000-volt high-tension power line planned between Nantes and La Martyre (Finistere) will not be given up. While the regional council, by the vote of its chairman, Raymond Marcellin, recently refused to engage in a debate on energy in the absence of the nuclear project, Edmond Herve stressed that "Brittany is not on the list of nuclear sites for 1986, and that is definitive." On the other hand, it will be equipped with one of the three coal-fired thermal power plants provided for in the government's energy program for the interim-plan period. The minister, after repeating the government's desire to diversify resources, stated that Brittany was to be oriented mainly toward micro-power plants. "It is the local collectivities that must check out the sites in function of the problems that this can entail," Edmond Herve indicated; he then repeated that the proportion for renewable energy sources--presently 2 percent of production--should be raised to 14 percent in 1990. Anothr problem taken up in the course of this meeting with the Socialists of Morbihan was the Nantes-La Martyre high-voltage line, which disturbs farmers and ecologists. This "electric-power freeway" will be built. Edmond Herve specified, however, that he has "ordered that information and consultations continue and that the population be addressed in clear language." [Text] [Paris LE MATIN 19 Apr 82 p 16] 11267

CSO: 5100/2150

ENVIRONMENTALISTS PROTEST RESEARCH POWER PLANT IN TUSCANY

Rome LA REPUBBLICA in Italian 6 Apr 82 p 35

[Article by Francesco Canosa: "Alarm in Tuscany, 'The PEC (Fuel Element Testing) Can Kill'"]

[Text] Florence, 5 April--Construction work on PEC should be suspended immediately. This is the drastic message of a press conference held in Florence by the regional secretaries of the Environmental League of ARCI [Italian Cultural Recreational Association] for Emilia Romagna (Emilio Lonardo) and Tuscany (Riccardo Basosi); the president of the Tuscan League, Enzo Tiezzi; and Arturo Pasquinelli and Massimo Nutini, assessor and president, respectively, of the Environmental Commission of the Commune of Vernio.

PEC stands accused, but so does the CNEN [National Nuclear Energy Commission], which is insisting that PEC be built despite the dissenting opinion of many scientists and the protests of several communes on the Tuscan slope of the Tuscan-Emilian Appennines. PEC is a plant for research on the fuel elements of fast reactors; it is experimental; and it is the only plant in Italy that would use both uranium and plutonium. But it has more than a few defects (according to its opponents), which can be summarized under three headings: health hazards, economic inefficiency, and the uselessness of our country's producing nuclear energy.

The first reason for asking that construction work be suspended is the fact that the site is clearly in an area subject to earthquakes. Between July 1981 and the present, more than 50 grade 5 eqrthquakes have been recorded with their epicenter in the high valley of the Bisenzio, between Vernio and the Brasimone (in Emilia, where PEC is being built). "Everyone knew about this in 1960," Nutini claims, "becuase it was established in a study made by geologists for the Ministry of Industry. The report ended up in some drawer at the Ministry; now the Magistrate of Porretta Terme has asked AGIP National Italian Oil Company to get it out."

Furthermore the CNR National Research Council, in proposing a new classification system for Italian seismic zones, saw fit to include the communes of the Tuscan side of the Appenines but not the Emilian side; it asked for new verifications for the Emilian side, "as though there could be a hump in the propagation of seismic waves," said Pasquinelli.

Besides the health hazards involved, there are economic and financial reasons for not proceeding with the construction of PEC. "Meanwhile, the original cost of 250-300 billion lire has become 1,100 billion," says Basosi. "Four hundred billion have been spent so far; 700 more will be needed if everything goes well. Only 150-200 would be needed to dismantle it; this would represent a huge saving." According to Basosi, who is professor of chemistry and physics at the University of Siena, "There can be no doubting the fact that PEC will never become operational." One reason is that even if Italy has nuclear power plants, "Twenty years from now," says Tiezzi, director of the Chemistry Institute of the University of Siena, "there won't even be a gram of uranium in the world." And nuclear power is no longer a relatively cheap energy source. During the press conference it was pointed out that Giorgio Nebbis, professor of the technology of marketable goods at the University of Bari, has demonstrated beyond a shadow of a doubt that nuclear power is no longer cost efficient. According to Nebbia, "We have lost the illusion of the 1970's that it was possible to produce a kilowatt hour of nuclear power for 25-27 lire, as opposed to 25-30 lire for energy from coal and 45-55 from oil. Today, unfortunately, nuclear power costs 50 lire per kilowatt hour, as opposed to 47 for energy from coal and 74 for energy from fuel oil."

But can our country give up nuclear power with no qualms? According to Tiezzi, we need look no further than the national energy plans adopted first by Minister Pandolfi and then by Marcora, as well as the calculations submitted by the National Committee for Energy Choices, for an enlightening answer. "PEN's National Energy Plan calculations are clearly wrong," says Tiezzi, "and I can prove it. The Pandolfi plan predicted that energy consumption in 1990 would be 200 million tons of oil equivalents, including 10 million from nuclear power. The Marcora plan predicts energy consumption by 1990 will be 185 tons of oil equivalents--15 less than the Pandolfi plan, but still including nuclear power." Why? "Do you want to know who wants nuclear power regardless of the cost and health hazards?" says Tiezzi dramatically: "It's the people who don't want a gas pipeline from Russia."

9855
CSO: 5100/2151

END

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21 May 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 145

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21 May 1982

WORLDWIDE REPORT

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HIGH HOPES FOR NUCLEAR POWER DEVELOPMENT BELIED

Madras THE HINDU in English 20 Apr 82 p 8

[Editorial]

[Text]

THE NUCLEAR POWER sector is one of the critical fields of development in which high hopes raised earlier have been sadly belied. Whatever the capabilities of Indian scientists—and the accepted tall international stature of some of them—for one reason or another the work translated on to the ground has not been of the order expected. This is the silver jubilee year of the Bhabha Atomic Research Centre, Bombay. BARC, together with the Tata Institute of Fundamental Research, forms the springboard of the nation's nuclear programme. The activities of the Department of Atomic Energy have been shrouded in greater secrecy than the functioning of other wings of the Government. This feature makes it difficult to pinpoint the errors of commission and omission. The future of the first nuclear power plant at Tarapur, in commercial operation since October 1969, is clouded in view of the discord over the American supply of enriched uranium. This plant is being run at sub-optimal levels due to the shortage of the primary fuel. Because Canada went back on contractual obligations after the Indian nuclear test in May 1974, the Rana Pratapsagar station in Rajasthan was delayed. The first unit there had been operational since the end of 1973, but the second went into commercial operation in April 1981 after heavy water was obtained from the Soviet Union. The conditions governing this supply were stringent, since the Russians were also as insistent as the Western nations on the discriminatory safeguard clause under the nuclear non-proliferation treaty. The water leak in the Rajasthan station has also upset the power generation programme. The shutdown of this unit for several months indicates the complex operational and safety problems in nuclear power-houses.

The Madras Atomic Power Project, at Kalpakkam, has been delayed by many years. It is several months since the station is said to have been ready for commissioning, but the needed heavy water is not in sight. Obviously, the Government of India is not inclined to opt for purchases from abroad under restrictive conditions. The Baroda and Tuticorin heavy water plants have yet to overcome technical snags. It is difficult, therefore, to accept the Atomic Energy Department's promise in its annual report that Kalpakkam will be commissioned this year. Under the old Sarabhai plan 2,700 MW of nuclear plants were to have been in place by 1980. The installed capacity is now a meagre 860 MW, with construction going on at Narora in Uttar Pradesh. A plan drawn up by the Atomic Energy Commission envisages installed nuclear power capacity of 10,000 MW by the end of this century. This aim is out of reach, if the present state of affairs is permitted to continue.

CSO: 5100/7085

BRIEFS

NUCLEAR TEST--According to the INDIAN WEEKLY Sunday, India is to carry out its second nuclear test at the Pokhran site in the Rajasthan desert. It says the Indian army has sealed off the test site and the local population has been asked to remain ready for evacuation shortly. [Text] [BK111017 Karachi Domestic Service in English 1005 GMT 11 May 82]

THORIUM UTILIZATION STUDY--New Delhi, (INFA)--The Department of Atomic Energy has drawn up a long-range programme for the utilization of thorium for power production. A separate reserach centre has been set up for testing thorium for the production of energy in fast reaction. Thorium reserves in India are much larger than known uranium reserves. It is the Department's intention to make optimum utilization of thorium. [Text] [Bombay THE TIMES OF INDIA in English 19 Apr 82 p 13]

CSO: 5100/7084

ISLAMIC COOPERATION IN PAKISTAN'S ATOMIC PROGRAM URGED

Rawalpindi TAMEER in Urdu 15 Mar 82 p 2

[Article: "The Philosophy of Islamic Bomb"]

[Text] President Zia-ul-Haq, during an interview with a Saudi paper, as he explained Pakistan's limited nuclear program, also questioned why it is branded as an "Islamic bomb." The United States, Israel, the Soviet Union and India are also atomic powers. Why aren't their bombs called "Christian bomb," "Jewish bomb," "communist bomb" and "Hindu bomb?"

President Zia has said this before and has reiterated it. In our view the Islamic countries are fully aware of this issue. Islamic countries have an important place of power in the world with respect to their numbers, population, area and issues. But their importance is mentioned only when other countries have an axe to grind with them and want to use them. Otherwise, their political importance, economic progress and technological advance are not looked on with favor.

Pakistan is a country with limited economic resources. Overpopulation and poverty are common. In spite of this and the difficulties created by the recurring political crises and neighboring countries, its people have made special efforts to overcome their backwardness in technology. The result of that effort is that Pakistan has reached the point where it can become a nuclear power in a few years if it so wishes. But this very capability bothers other countries, even those who claim to be its friends.

Pakistan does not have all of the technical resources and materials needed to be an effective nuclear power. All of the powers are aware of this. Therefore, they are not worried about that as much as they are about other Islamic countries entering the modern era because of Pakistan's progress in nuclear science.

Pakistan has always expressed feelings of friendship and cooperation toward the Islamic countries. Therefore, other powers believe that Pakistan will never hesitate to include fraternal Islamic countries in its technological progress.

The prejudice that is found in other countries toward Islamic countries is actually responsible for the branding of nuclear progress in Pakistan as being Islamic. The Islamic countries should make a special note of this.

If Pakistan's nuclear program is an Islamic program, then it is the duty of all Islamic countries to devote all of their resources to making it a reality. Help should not be limited to Pakistan. If any Islamic country has the capacity to move forward, it should be the duty of all Islamic countries to help it and to accelerate the rate of its progress.

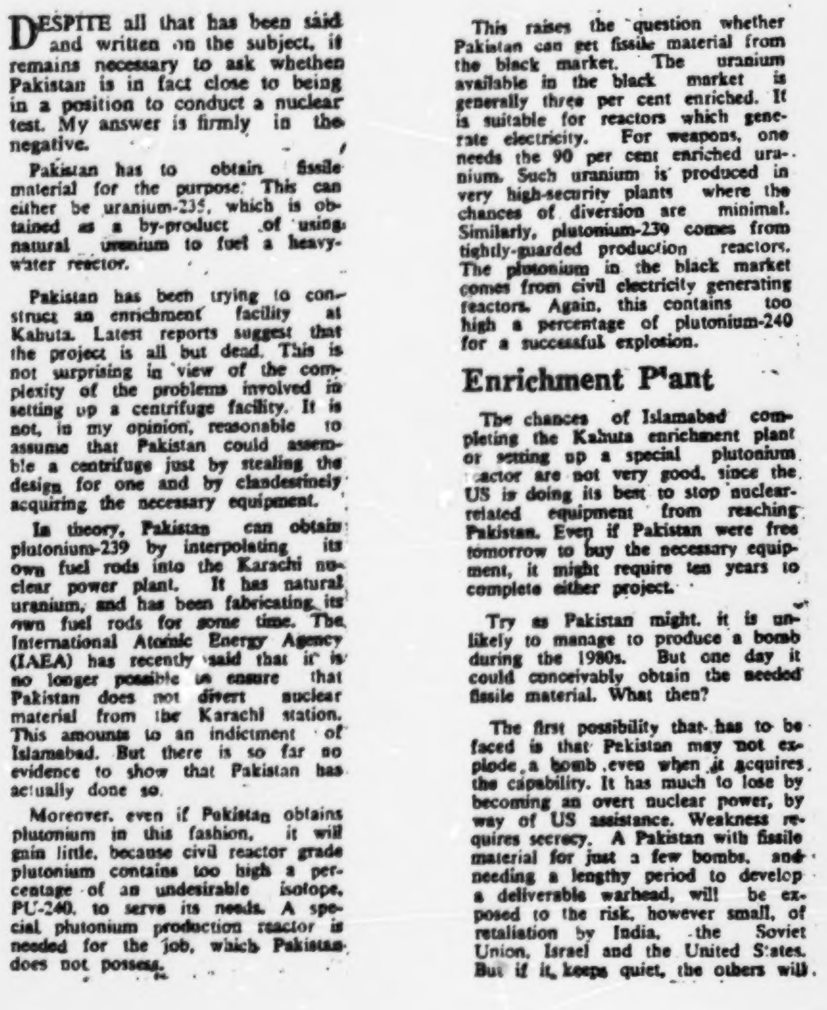
9859
CSO: 5100/5460

SERIOUSNESS OF PAKISTAN NUCLEAR 'THREAT' QUESTIONED

Bombay THE TIMES OF INDIA in English 20 Apr 82 p 8

[Article by Ravi Rikhye]

[Text]



DESPITE all that has been said and written on the subject, it remains necessary to ask whether Pakistan is in fact close to being in a position to conduct a nuclear test. My answer is firmly in the negative.

Pakistan has to obtain fissile material for the purpose. This can either be uranium-235, which is obtained as a by-product of using natural uranium to fuel a heavy-water reactor.

Pakistan has been trying to construct an enrichment facility at Kahuta. Latest reports suggest that the project is all but dead. This is not surprising in view of the complexity of the problems involved in setting up a centrifuge facility. It is not, in my opinion, reasonable to assume that Pakistan could assemble a centrifuge just by stealing the design for one and by clandestinely acquiring the necessary equipment.

In theory, Pakistan can obtain plutonium-239 by interpolating its own fuel rods into the Karachi nuclear power plant. It has natural uranium, and has been fabricating its own fuel rods for some time. The International Atomic Energy Agency (IAEA) has recently said that it is no longer possible to ensure that Pakistan does not divert nuclear material from the Karachi station. This amounts to an indictment of Islamabad. But there is so far no evidence to show that Pakistan has actually done so.

Moreover, even if Pakistan obtains plutonium in this fashion, it will gain little, because civil reactor grade plutonium contains too high a percentage of an undesirable isotope, PU-240, to serve its needs. A special plutonium production reactor is needed for the job, which Pakistan does not possess.

This raises the question whether Pakistan can get fissile material from the black market. The uranium available in the black market is generally three per cent enriched. It is suitable for reactors which generate electricity. For weapons, one needs the 90 per cent enriched uranium. Such uranium is produced in very high-security plants where the chances of diversion are minimal. Similarly, plutonium-239 comes from tightly-guarded production reactors. The plutonium in the black market comes from civil electricity generating reactors. Again, this contains too high a percentage of plutonium-240 for a successful explosion.

Enrichment Plant

The chances of Islamabad completing the Kahuta enrichment plant or setting up a special plutonium reactor are not very good, since the US is doing its best to stop nuclear-related equipment from reaching Pakistan. Even if Pakistan were free tomorrow to buy the necessary equipment, it might require ten years to complete either project.

Try as Pakistan might, it is unlikely to manage to produce a bomb during the 1980s. But one day it could conceivably obtain the needed fissile material. What then?

The first possibility that has to be faced is that Pakistan may not explode a bomb even when it acquires the capability. It has much to lose by becoming an overt nuclear power, by way of US assistance. Weakness requires secrecy. A Pakistan with fissile material for just a few bombs, and needing a lengthy period to develop a deliverable warhead, will be exposed to the risk, however small, of retaliation by India, the Soviet Union, Israel and the United States. But if it keeps quiet, the others will assume the worst. This is already happening. In India we talk as if Pakistan is about to explode a bomb at any time. In Pakistan, it is commonly assumed that India is already a covert nuclear power.

A covert Pakistan bomb will create difficulties for us. Whereas an explosion will unite India into going nuclear with a vengeance, we will be unsure of how to deal with the situation if Islamabad does not demonstrate its capability. It is possible that it will create enough uncertainty to deter India in a crisis. There might be only a small chance that an untested Pakistani bomb will work on delivery, but New Delhi might not want to take the risk.

Unlike India, which is yet to articulate clearly a strategic doctrine for nuclear weapons, Dr. Stephen Cohen suggests that Pakistan already has evolved one. Dr. Cohen is unique among American scholars in that he is welcome and trusted in both India and Pakistan. From what he has been told by Pakistanis, it appears that its primary purpose is deterrence against India; next comes prestige, and last, the expectation of coercive use. Pakistanis envisage the possibility of using the nuclear cover to protect a conventional grab of Kashmir if the Indian government is weak. But this must be only a theoretical formulation. For a nuclear Pakistan necessarily means a nuclear India and all that it implies. Islamabad also cannot be sure what New Delhi will do in such an eventuality.

Attack Aircraft

If Pakistan should go nuclear (or, as some would argue, *when* Pakistan goes nuclear), the question of delivery capability will arise. Pakistan's standard attack aircraft is the Mirage-5, which has very limited range at low level. With a one-ton payload it is unlikely to do better than a 160-kilometer radius. The main threat will then be to Punjab, a circumstance that may have wide repercussions even if India itself has the bomb. No nuclear power to date has to live with the knowledge that only one particular part of its territory is vulnerable.

At high level, the Mirage-5's range increases, so that with aerial refuelling, attacks as far south as Bombay become possible, but given India's air superiority, a high-level attack may have a very low probability of success. The F-16's Pakistan will be acquiring, are incapable of delivering nuclear weapons.

This, plus the limited mirage 5 radius indicates that Pakistan must look for a new aircraft. Had it been serious at this stage about a nuclear delivery capability, it would have chosen the A-7 Corsair 11. The A-7 was proposed for sale to Pakistan in 1976, but vetoed by the Carter administration. This plane is a superb light bomber, unlike the F-16 which has only a secondary attack capability.

Mr. Ravi Rikhye contests the widespread view that Pakistan is in a position to go in for a nuclear explosion in the foreseeable future. We publish his article in order to draw attention to this view.

India may find an aircraft threat from Pakistan manageable. Using airborne early warning and control aircraft plus interceptors armed with long-range shoot-down missiles, a high percentage of attackers can be taken care of. The U.S. navy regularly turns in 100 per cent kills with its Hawkeye | Tomcat combination in exercises held against foreign aid forces. This in turn raises the possibility that a Pakistan nuclear bomb may not prove a real deterrent against a determined Indian leadership.

If India initiates a crisis, it can make a conventional pre-emptive strike against Pakistan's nuclear-armed aircraft, and count on a sophisticated air defence to take care of aircraft which escape the initial attack. Of course, India would not take the risk except for the very highest of states. But that is a different issue.

Assuming we are convinced that Pakistan will at some undefined future time, go nuclear, what should we do? Most Indians would say, "we must respond." But this is wholly inadequate.

First, there may be sound re for India to go nuclear, regardles what Pakistan does. A recent seminar held at the centre for policy research, New Delhi, grappled with just such issues. Though a wide range of views emerged, there was a consensus that Pakistan should not be allowed to determine India's nuclear programme.

Secondly, an adequately nuclear-armed Pakistan will once and for all foreclose India's options vis-a-vis Kashmir and the rest of Pakistan. The term "adequately" is used because, as already mentioned, India might not be deterred by just an aircraft threat from Pakistan.

India has violently resisted the notion of Pakistan acquiring military parity with it. A nuclear-armed Pakistan will achieve precisely that parity. Pakistan will then be in a position to determine our responses to that country.

CSO: 5100/7086

BRIEFS

PROTEST OF FRENCH N-TEST--PORT MORESBY--The Papua New Guinea Foreign Affairs and Trade Minister, Mr Levi, has called for "a chorus of protests" over the latest French nuclear bomb test on Mururoa Atoll in French Polynesia. Last Sunday the New Zealand Industrial Research Department recorded a 15-kiloton blast at Mururoa. The explosion was the 48th underground test on the atoll since 1975. Papua New Guinea's protest at the latest test is the strongest yet voiced on the issue, especially as Mr Levi and the Fiji Prime Minister, Ratu Sir Kamisise Mara, returned from Paris only a fortnight ago after protesting directly to French President Mitterrand. Mr Levi said: "It appears the French Government has no regard to the opinions of groups or the rights of island people." He said if Pacific island nations stopped voicing their anger at "the continued nuclear contamination" of the environment, their dreams of a nuclear-free Pacific would be irrevocably lost. France's attitude was another case of small countries being pushed around by countries with economic and military strength, he said. In Paris, the French Defence Ministry refused to comment yesterday on reports that France had exploded a nuclear device underground on Mururoa. [Brisbane THE COURIER-MAIL in English 27 Mar 82 p 12]

CSO: 5100/7527

BRIEFS

URANIUM PURCHASE--Kuwait has taken a more serious step with regard to plans to build nuclear reactors with Canada's cooperation. An agreement was signed with Niger worth 40 million pounds sterling to buy a third of the production of the Tassa N'Taghalgue Company for the Production of Uranium. The capital of this company is divided among the government of Niger and the French General Nuclear Materials Company (COGEMA). Saudi Arabia has received two Nigerien ministers but no agreements to buy uranium have been announced even though Saudi Arabia's aid to Niger is valued at 30 million pounds and represents 70 percent of the total aid received by this poor African nation so rich in uranium. [Text] [Amman AL-UFUQ in Arabic No 3, 14-20 Apr 82 p 9]

CSO: 5100/4720

INTEREST IN ACQUIRING NUCLEAR REACTOR FROM UK REPORTED

TA021203 Tel Aviv HA'ARETZ in Hebrew 2 May 82 pp 1, 2

[Report from London by Yosi Melman]

[Excerpts] London, 1 May (Special to HA'ARETZ)--Israel is interested in acquiring from British companies, an atomic reactor for generating electricity, the HA'ARETZ correspondent has learned from authoritative sources. Israel's request in this matter is part of what appears as a comprehensive effort to attract British investors for the development of energy resources in Israel, including oil exploration in the Mediterranean, development of coal industry and solar energy.

However, the plan to establish an atomic power station was the chief objective of the visit to Britain last week by energy and infrastructure minister Yitzhaq Berman.

It has been learned that Minister Berman met with representatives of leading British companies in the atomic power stations market. Despite the blackout imposed on the talks, it has been learned that one of the companies with which Minister Berman had contact is the G.E.C. [General Electric Company], the manufacturer of atomic reactors and power stations, which is headed by the Jewish businessman, Lord Weinstock.

The second company is the planning and consulting firm for nuclear power stations in London. Minister Berman declined to comment on the report, but informed sources said this was his second visit to Britain in the last 3 weeks on this matter.

Along with the talks in Britain, Israel is conducting contacts with companies in France, the United States and Canada. However the main obstacle to carrying out a deal for the purchase of a nuclear reactor for generating electricity is political: Israel's refusal to sign the international convention to prevent the proliferation of nuclear arms.

Recently, Israel has found greater readiness on the part of international companies including British ones to cooperate in working out a new formula that might enable Israel to buy a nuclear reactor priced at about a billion dollars without signing the nuclear nonproliferation convention.

According to this formula, the deal would receive final approval before the completion of the power station's construction, which would take about 10 years. This approval would come from the concerned government and not before the signing of the contract. According to the sources, the international companies with which Israel is maintaining contacts have agreed to try to persuade their governments to accept the formula.

CSO: 5100/4719

TWO NEW NUCLEAR PLANTS TO BE CONSTRUCTED

Tel Aviv MA'ARIV in Hebrew 25 Mar 82 p 16

[Article by Avraham Peleg, MA'ARIV science correspondent: "David Hago'el at the Meteorology and Energy Conference: Nuclear Power Plants Will Be Set Up in the Halutza Area"]

[Text] Nuclear power plants will be set up in the Halutza area. At the first stage there will be two units, each producing 900 megawatts. Afterwards two more units will be set up, of similar output. The intent is to complete the set-up of one or two nuclear reactors by 1994. These details were released by David Hago'el, chairman of the electric company directorate. He spoke at a festive dinner held in honor of the first scientific conference for "meteorology and energy in Israel 1982," which ended yesterday at the "Princess" hotel in Netanya. The conference lasted 2 days.

David Hago'el reported to MA'ARIV that today's estimated investment for each of the nuclear power plants that are to be started shortly is $1 billion. Israeli operatives are frantically scouting nuclear reactor manufacturers in Europe, the U.S. and Canada. Hago'el noted that the fact that Israel is not a signatory of the nuclear non-proliferation pact makes contact with nuclear reactor manufacturers more difficult, but the manufacturers are today languishing in an economic crisis and are therefore open to commercial contact.

With the operation of the plants, the division of electrical generation sources will be as follows: nuclear energy--20 percent, coal--60 percent and the rest--oil and other sources.

Total electrical output in Israel today is about 2000 megawatts. With the completion of four power units (coal-fired) in Hadera in 1984, Israel will generate 3400 megawatts of electricity.

Professor Yuval Ne'eman noted in a precis that was presented to the conference-goers that environmental considerations determined the preference of the Qatif-Metzada layout for the two-seas canal project.

Professor 'Adi'el Cohen, of the department of atmospheric sciences at the Hebrew University, lectured on changes in radiation in the Dead Sea region. He said that changes at the level of 50 percent have occurred in the evaporation of Dead Sea water as a result of changes in radiation.

The chairman of the conference, engineer Abraham Shechterman--who serves as the chairman of the Mediterranean Sea-Dead Sea company--said that the length of the two seas canal would be 115 kilometers and the length of the tunnel in the canal would be 80 km. It would be the second longest canal in the world.

Professor Y. Tadmor, the coordinator for nuclear research in Nahal Shoreq, said that the coal used for the oepration of power plants contains tiny amounts of radioactive substances. Following combustion a portion of these substances is vaporized and released into the atmosphere. Humans are therefore likely to be exposed to radiation. He added that the radiation influences the respiratory and digestive systems, since man also swallows food that his absorbed radiation. The population residing near the coal-fired plant absorbs an amount of radiation equivalent to that caused by the operation of nuclear power plants--and sometimes even more.

The head of the center for energy research at the Weizman Institute, Professor Israel Dostrovski, reported at the conference that a "solar tower" will be set up at the Institute at the center of a collector field. He lectured on the exploitation of solar towers for the distribution of energy on a large scale. Basic collector technology was developed at five places in the world for the generation of electricity. But the "solar tower" programs of the Weizman Institute were not intended for the distribution of electricity, but for the distribution of industrial and chemical-reactive energy. "These kinds of energy are no less important to us than electricity," the Weizman Institute scientist said.

Y. Porat and A. ben Dov, of the research and development branch of the electric company, reported on company programs for the exploitation of wind energy in Israel. In the framework of this research, a wind turbine will be set up in 1983, and in years 1985-1986 the first wind turbine farm will be established.

9794
CSO: 5100/4714

HELICON URANIUM ENRICHMENT COUNTERS WORLD NUCLEAR SANCTIONS

Capetown DIE BURGER (SUPPLEMENT) in Afrikaans 27 Apr 82 pp 2-3

[Text] It is already generally known that South Africa has a uranium enrichment process and that in the mid 1980's it will go into production with a large enough capacity for providing for South Africa's own needs. What perhaps is not so generally known is the role which uranium enrichment plays in modern nuclear technology, or rather why uranium enrichment is at all necessary.

In order to answer this question it is first of all necessary to explain what uranium enrichment is. It is known that uranium is one of the few natural elements having certain radioactive characteristics. This means that atoms of this element can be split with the accompanying liberation of great amounts of energy in the form of heat and atom particles which in turn hit and split other atoms creating the so-called chain reaction.

However, not all of the uranium's atoms have this fissioning characteristic and as a matter of fact only about 0.7 percent of the uranium's content is fissionable. This isotope (atomic variation) has three fewer neutrons in its nucleous than the vast majority of uranium atoms which have an atomic weight of 238. The lighter isotope has an atomic weight of 235 and is known as 235 U.

Although certain nuclear reactors can work well on natural uranium it has been found that the best results, in terms of cost effectiveness, can be obtained if the contents of isotope 235 U can be increased to about 3 percent instead of the approximately 0.7 percent present in natural uranium. This increase in the content of 235 U is known as uranium enrichment and comes down to removing from the uranium some of the more abundant 238 U isotope. Thus the more 238 U can be removed from the uranium or stripped away from it the higher is the degree of enrichment.

Differing degrees of enrichment are being used in different reactors. Commercial reactors such as employed in the Koeberg power stations use about 3 percent enriched uranium in their fuel elements. In reactors which are utilized for research and the production of radio isotopes for medical and industrial applications, such as the Safari Reactor of the Council on Atomic Power, medium to highly enriched uranium is used as fuel.

Originally all the enriched uranium needed for these purposes had to be imported, while South Africa's natural uranium was being exported; but now the local enrichment industry can already partially fulfill the requirements for research fuel and in time it will be able to provide all the commercially needed supplies.

The history of the South African uranium enrichment industry, which has finally led to the founding of the Uranium Enrichment Corporation of South Africa (UKOR), began about 20 years ago. In the light of South Africa's great uranium reserves (the second largest in the world) and the fact that the nuclear industry increasingly became bent upon using enriched uranium as the fuel, it was then decided to proceed with the development of our own enrichment industry.

At that stage the most popular process for isotope separation was the so-called gas diffusion process which was first perfected by Americans. The process comes down to having uranium in combination with flourine (uranium hexaflouride) pass through a membrane having a great number of tiny orifices in this gaseous state. The lighter atoms move faster through the membrane with the result that the gas behind the membrane is a bit richer in 235 U.

Another process which is now winning ground is the so-called gas centrifuge process by means of which the uranium hexafouride goes through a centrifugal process, somewhat like the old time cream separators, with the result that the heavier atoms move outwardly and some of the lighter isotopes can be separated.

The technology connected with both of these techniques is expensive and at that stage was still out of reach of South African capabilities. Moreover, those foreign entities having the know-how guarded their secrets jealously and it was clear that if we were to move in this direction it would come down to having to invent the wheel all over again. A whole new approach had to be followed.

A team of engineers and scientists, under the leadership of Dr A.J.A. Roux, now chairman of UKOR, and the present managing director of UKOR, Dr. W.L. Grant undertook this task with enthusiasm and dedication and within a few years came up with a process so unique and so effective that it had the international nuclear community guessing and buzzing. In 1971 this led to the establishment of UKOR under the chairmanship of Dr Roux who was given the order to proceed with the construction of a pilot plant meant to test out the process in actual operation. In 1978 the government announced that an expansion of the plant would be undertaken for the purpose of providing its own enrichment requirements in South Africa.

The land between the hills of Valindaba, where this new industry is springing up, is an ants' nest of activity. The buildings and structures being built for housing the production plant and the other related plants cover about 74,000 square meters. A special plant is under construction where the ammonium diuranate obtained from the mines will be converted into uranium hexaflouride gas and a flourine plant is also being built. In addition a hydrogen plant is under construction.

Although the further refinement of the UKOR process (a technique known as the helicon technique) has made possible the building of a more effective and more compact plant, the main processing room is still about five stories high and its floor space can easily accommodate two rugby fields. The ventilation towers, the points of which can be seen from the road, have already become a landmark in the surroundings.

Due to the fact that UKOR has depended heavily on inudstry, because of the many foreign attempts to obstruct South Africa's nuclear industry, its development has provided an important stimulus in the heavy and light precision industries. The engineering challenges which have arisen are almost unknown in the country and nearly every discipline of applied science has been able to make some contribution. Moreover, the many support functions which must be fulfilled have created jobs and challenges over a wide spectrum.

The necessity of establishing our own South African enrichment industry had already been shown by the problems experienced in obtaining nuclear fuel for Koeberg and by UKOR's having to provide medium enriched uranium to the Council on Atomic Power as a result of the U.S. refusal to meet its contract for supplying fuel for the Safari reactor. The mere existence of the industry is giving South Africa greater bargaining power in international neotiations and as the industry gets going it will be playing a greater role in protecting the country from international extortion.

Today the energy hungry world is subject to the whims and caprices of the countries controlling the major sources of energy. In the case of oil the Arab countries were to ones to blackmail the world during the past decade, while South Africa itself also had some hard experiences with the importation of nuclear fuel. But the fact still remains that the world's fossil fuel resources are not inexhautible and that, whatever opposition there may be, for the present nuclear power is offering the only viable alternative.

Actually the world is now in the threshold of an age which in the future will perhaps be known as the nuclear age. Thus nuclear fuel technology, and especially UKOR, have become an indispensable link in putting South Africa firmly on the road of this development.

7964
CSO: 5100/5649

TECHNICAL ASPECTS OF THE WA-350 REPROCESSING FACILITY

Graefelfing ENERGIEWIRTSCHAFTLICHE TAGESFRAGEN in German /02/1982, V0032, N0002, pp 154-156

[Article by Graduate Engineer Joachim Mischke, member of the board of the DWK (German Company for Nuclear Fuel Reprocessing), and Graduate Economist Juergen Rehnelt, member of the staff of the board of the same company, Hannover]

[Text] 1. Basic Political Conditions

The policy decision arrived at jointly by the Federal Government and the Laender, which is binding until the year 1985, provides for the construction of a reprocessing facility--regardless of any decisions which may be made at that time [1]. In connection with this decision, the leaders in the Federal Land of Hesse have expressed their readiness to accommodate a reprocessing facility within their sovereign territory. However, the size of such a facility was restricted to 350 tons of throughput on the part of the Hesse policy makers. In view of the fact that such a facility would not be large enough to be able to cover future waste-disposal needs--discernible even after the third updating of the energy program of the Federal Government--other Laender have likewise declared their readiness to accommodate a reprocessing facility [2]. For the time being, a facility size of 350 tons of annual throughput forms the basis as well for similar but even more extensive waste-disposal considerations within the Federal Government and Laender.

This facility size--after being stipulated by the Hesse Land government and adopted in this form as the basic consideration by other Laender as well--made it necessary to readjust to smaller dimensions the technical planning for the original Gorleben facility, which had been committed to a throughput size of double this amount for each operational leg (1,400 tons of annual throughput). On the other hand, "large" plant components are already undergoing full-scale testing at a research unit of the Karlsruhe Nuclear Research Facility.

A reprocessing plant with an annual throughput of 350 tons (WA-350) represents only a 10-fold scale-up of the Karlsruhe Reprocessing Facility (WAK) with respect to annual throughput. For the most part, the scale-up factors for individual pieces of plant equipment themselves are even smaller. For example, for piping systems the aforesaid enlargement of throughput results in a scale-up of the flow rate of only about 1 : 3.

Contrary to a number of public debates, in creating new systems it is not unusual to develop such scale-ups (although in light of the already ongoing component testing, one must speak if anything about scale-downs). This is shown by examples in other countries. France and Great Britain are building facilities with throughputs which had been planned for the German Gorleben plant. In Japan, a 200-ton reprocessing plant was built and put into operation in Tokai-Mura practically from scratch--although with French help.

2. The Reprocessing Operation

In the WA-350 as well, the reprocessing of spent fuel assemblies works in principle as shown in Figure 1:

The spent fuel assemblies are unloaded from the reactor, stored for some time, and finally transported to the reprocessing plant. There the fuel assemblies are cut up into small segments and the nuclear materials contained in them are dissolved out by means of an acid treatment. This leaves behind the cladding, which is sent on to the waste-treatment section.

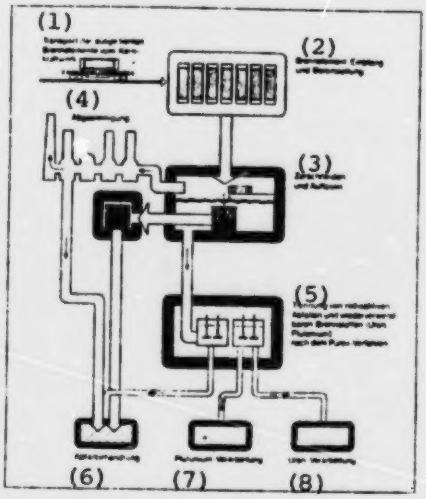


Figure 1: Schematic Diagram of Reprocessing System

Key:
1. Transporting of spent fuel assemblies from the nuclear power plant
2. Fuel-assembly receiving and readying
3. Cutting up and dissolution
4. Waste-gas purification
5. Separation of radioactive wastes and reusable fuels (uranium, plutonium) according to the Purex procedure
6. Waste treatment
7. Plutonium processing
8. Uranium processing

Through chemical techniques, from the solution thus obtained a separation is effected between the reusable materials uranium and plutonium and the non-reusable fission products which have formed during the operation of the reactor. In an additional step, uranium and plutonium are separated from one another and purified. The plutonium and a portion of the uranium is made directly into new fuel (mixed oxide), while the remaining uranium must be enriched again--just like the natural uranium directly recovered from a uranium mine--before it can be used for electricity generation in the nuclear power plant.

Depending on their material properties and radioactivity, the non-reusable fission products which have been separated out together with the waste products from the reprocessing operation are converted into forms suitable for ultimate storage, packed up, and finally put into an ultimate-storage reservoir.

To be used as a reprocessing technique is the PUREX method, in agreement with the systems being applied today in almost all countries with reprocessing facilities. The term PUREX stands for "plutonium-uranium-reduction-extraction procedure." It should be noted that this method is carried out at normal air pressure, in fact even at negative pressure to some extent, throughout the reprocessing cycle. The maximum temperature occurring in the reprocessing operation is no more than 130°C--with the exception of the vitrification of the wastes. This temperature is necessary only to dissolve the fuel-assembly pieces in nitric acid and to boil down the solutions. At all other points, the work is done at room temperature. It is also an advantage that the equipment used in this reprocessing technology is largely of a conventional type and is similar to the machinery used in other chemical production facilities, such as for example in petroleum refineries or in ore dressing systems [3].

Table 1: Main Characteristic Data of the WA-350

Throughput:	350 tons
Uranium component	330 t/a
Plutonium component	3.75 t/a
Fission products	16.25 t/a
Average initial enrichment of the fuel assemblies	3.6 percent by weight of U-235
Average burnup of the fuel assemblies	40,000 MWd/t
Cooling-off period of the fuel assemblies	7 years
Outgo to the ultimate storage facility	
Molds (glass blocks)	215 pieces/a
Tritium-containing water	1,350 m^3/a
Waste drums	11,100 pieces/a

The PUREX procedure was developed in the United States toward the end of the 1940's and was first used in the American Hanford Facility in 1954. So far, this extraction procedure has been used in the various plants around the world to process about 800,000 tons of uranium from military reactors, more than 30,000 tons of uranium from Magnox [gas-cooled graphite moderated] reactors, and about 1,000 tons of uranium from light-water reactors. This includes also fuel assemblies from American submarine reactors with burnups of about 100,000 megawatt-days per ton of uranium [4]. As a comparison: From German light-water reactors the intention is to reprocess fuel assemblies with an average burnup of 40,000 megawatt-days per ton of uranium.

3. Design Aspects of the WA-350

Leaving aside an adaptation of the WA-350 to the special features of a specific site, the facility could have the form presented in Figure 2:

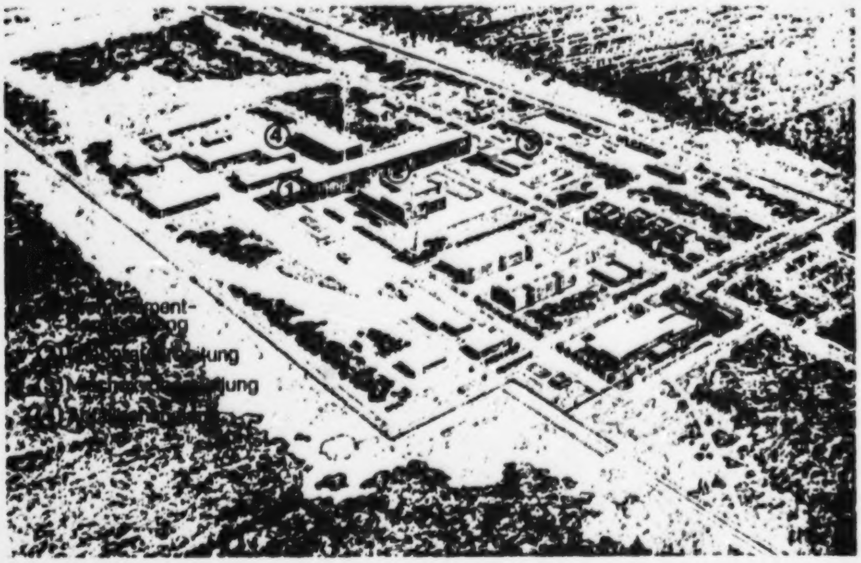


Figure 2: The schema shows how the reprocessing facility WA-350 might look, along with the most important plant components.

1. Fuel assembly readying
2. Reprocessing
3. Mixed-oxide production
4. Waste treatment

The overall plant complex consists of a number of processing buildings and installations for the infrastructure, such as power supply facilities, workshops, and so forth, which are connected to one another by plant roads and a rail system. The buildings will not exceed a height of 30 m and their foundations will be up to 10 m deep. A substantial portion of the radioactive materials is located in shielded processing cells, in some cases underneath the surrounding level of terrain. The walls, up to 2 m thick, and the retaining devices for radioactive materials guarantee the requisite radiation protection. All the control equipment and power-supply installations are positioned outside this wing. And the totality of processing cells and operating compartments are located under a sort of globe--the so-called "hard shell" made of reinforced concrete. Such a structure guarantees that even under actions from outside--such as, for example, an airplane crash--the integrity of the system is preserved.

The buildings in which slightly radioactive inventory is handled are designed as normal industrial structures, with due regard given to the necessary shielding. This applies, for example, to the processing stages for the after-purification of uranium and the cementation for weak-activity and medium-activity wastes.

As is shown in the layout plan, the power-supply building, the high-voltage switching facilities, the boiler house, and the water-treatment facility are set up apart from the processing buildings. The development of the plant grounds is effected both by rail and by road.

The general plant for the WA-350 differs from the integrated waste-disposal center above all in that the ultimate storage of radioactive wastes is not done at the site of such a plant. A Federal ultimate-storage facility designed for this purpose is to be established in Gorleben, provided that the relevant investigations on the salt dome turn out to be favorable (something which has not been made questionable by the studies done up to now).

In terms of process engineering, in essence nothing has changed. However, in many particular cases improvements have been made which embody the technical progress which has been achieved in the meantime. Moreover, because of the adjustment to a decreased throughput which has been made, it has proved possible to reduce considerably the scale of construction. The block diagram (Figure 3) shows schematically the operational steps in a WA-350.

In contrast to the Gorleben facility, no large interim storage area for fuel assemblies is planned at the WA-350 site. The fuel-assembly readying area has at its disposal a storage capacity of 200 t, which is needed on operational grounds, as compared to 3,000 t on the basis of the old plan. Transporting to the site and storage there is effected in shielded shipping and storage casks, which can accommodate up to 25 fuel assemblies, depending on the type.

The unloading of the fuel assemblies from the storage casks is done in the fuel-assembly receiving area. At the chemical head-end, the fuel pellets are dissolved out from the cut-up fuel assemblies. The separating off of uranium, plutonium, and fission products is done in the first extraction cycle. The second and third cycles serve the purpose of purifying the uranium or plutonium.

Based on the concept of the WA-350, a special advantage also arises with respect to the vitrification of the highly radioactive fission products.

Since the reprocessing facility receives only those fuel assemblies which have been stored for 7 years after their removal from the reactor cora--during which interim-storage time the radioactivity inventory of the fuel assemblies decreases significantly--and since the planning assumes an immediate vitrification of the fission-product solution after their separation, only relatively small buffer tanks will be necessary for disassociating the procedures "extraction" and "vitrification," and the longer-term interim storage of highly active fission product solutions is dispensed with.

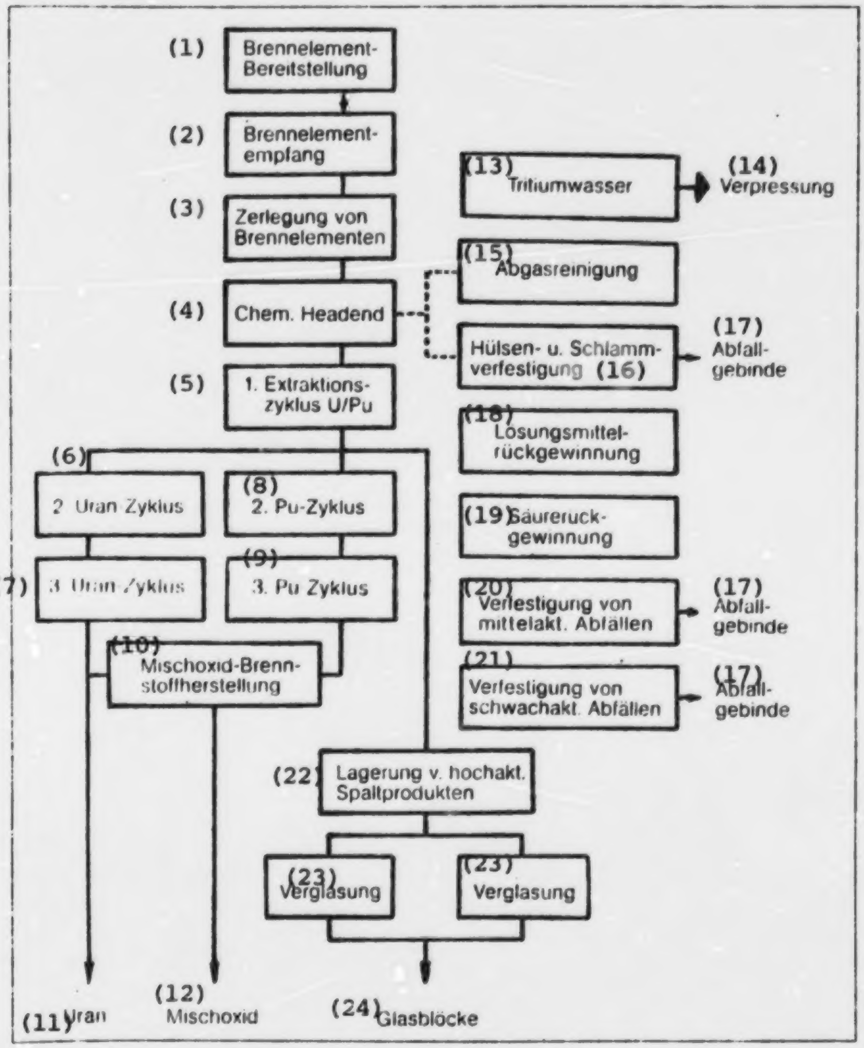

(1) Brennelement-Bereitstellung
(2) Brennelement-empfang
(3) Zerlegung von Brennelementen
(4) Chem. Headend
(5) 1. Extraktions-zyklus U/Pu
(6) 2 Uran Zyklus
(7) 3 Uran Zyklus
(8) 2. Pu-Zyklus
(9) 3. Pu Zyklus
(10) Mischoxid-Brenn-stoffherstellung
(11) Uran
(12) Mischoxid
(13) Tritiumwasser
(14) Verpressung
(15) Abgasreinigung
Hülsen- u. Schlamm-verfestigung (16)
(17) Abfall-gebinde
(18) Lösungsmittel-rückgewinnung
(19) Säureruck-gewinnung
(20) Verfestigung von mittelakt. Abfällen
(17) Abfall-gebinde
(21) Verfestigung von schwachakt. Abfällen
(17) Abfall-gebinde
(22) Lagerung v. hochakt. Spaltprodukten
(23) Verglasung
(23) Verglasung
(24) Glasblöcke

Figure 3: Block diagram showing the operational steps of a reprocessing facility for the upper throughput of 350 tons of uranium per year

Key:
1. Fuel-assembly readying
2. Fuel-assembly receiving
3. Cutting up of fuel assemblies
4. Chemical head-end
5. First extraction cycle, U/Pu
6. Second uranium cycle
7. Third uranium cycle
8. Second Pu cycle
9. Third Pu cycle
10. Mixed-oxide fuel production

[key continued on following page]

11. Uranium
12. Mixed oxide
13. Tritium water
14. Pressing
15. Waste-gas purification
16. Cladding and sludge solidification
17. Waste drum
18. Solvent recovery
19. Acid recovery
20. Solidification of medium-activity wastes
21. Solidification of weak-activity wastes
22. Storage of highly-active fission products
23. Vitrification
24. Glass blocks

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[1] See Bulletin of the Federal Government, No 122, 11 October 1979, p 1133 f.

[2] See also Bavarian State Legislature, Plenary-session Record 7/93, 6 March 1981, as well as the State Legislature of Rhineland-Palatinate, Plenary-session Record 9/36, 22 May 1981.

[3] See Baumgaertner: "Safety and Environmental Protection in Connection With Nuclear Waste Disposal," published by the federal minister for research and technology, Bonn, 1979.

[4] See "Arguments Pro and Con," record of statements made at the "Gorleben Hearings," First day, Hannover, 1979.

12114
CSO: 8120/1153

EXPERT DISCUSSES NUCLEAR INSTRUMENTATION RESEARCH, MARKET

Paris CEA NOTES D'INFORMATION in French Dec 81 pp 21-23

[Text of presentation given by Jacky Weill, head of the Nuclear Electronics and Instrumentation Department, at a colloquium at the Saclay Nuclear Study Center, 13-15 Oct 81: "Nuclear Instrumentation: How Far Have Research and Industry Gotten in France?"]

> [Text] "Electronic Information Days" were organized on 13-14-15 October 1981, at the Saclay Nuclear Study Center, by the Nuclear Electronics and Instrumentation Department [DEIN], in cooperation with various Electronics Units of the AEC.
>
> During those "Days," three major themes were touched on:
> . electronics and computer science at the service of medical instrumentation;
> . electronics, nuclear instrumentation, industrial development;
> . robotics, intervention in hostile environment.
>
> We are publishing below a presentation by Messrs Jacky Weill, head of the DEIN, and Rene Fabre, assistant to the head of the DEIN, which summarizes the research and development efforts in progress in the five sectors of this nuclear instrumentation and describes the status of French industrial activities on the basis of an estimate of the French market, of production, and of the flow of trade with foreign countries.

If the boundaries of the instrumentation market in France are not very precise, those of nuclear electronic instrumentation are even more difficult to define.

Considering the importance of research activities and of industrial activities in the nuclear fields, it would be desirable to know better the actual place occupied by this instrumentation, and its medium term prospects, as well as the situation of our industry, its performances and its competitiveness. Indeed, the results of scientific research, technological development and the high technology industries are closely linked to the quality of the instrumentation being used and increasingly require systems which resort to automation and to computer science.

For greater understanding and clarity, we will say that nuclear instrumentation is that which allows us to bring to the fore, to measure and to analyze nuclear phenomena or to control nuclear processes. It consists primarily of particle detectors accompanied by power supply, amplification, counting and selection mechanisms, and by computer systems for data processing.

For those various materials, we suggest a classification by major area of application:
- Health physics and radio-prospecting;
- Operation of nuclear reactors;
-- Operation of plants (development and reprocessing of the fuel, control of nuclear materials, etcetera);
- Instrumentation for research laboratories (power supplies for detectors, amplifiers, discriminators, NIM [Nuclear Instrumentation Modules] modular systems, CAMAC [Computer Application for Measurement and Control], analyzers, etcetera).

Research, Developments in Progress

The basic research takes place in laboratories of public institutions (AEC, universities, EDF [French Electric Company], etcetera) or of a few large manufacturers (CGE [General Electric Company], CSF [General Radio Company], RTC [possibly Compelec Technique Radio], etcetera); it does not usually produce short term industrial developments. Cooperation between public research institutions and industry is organized primarily for purposes of development.

In the technical area, the general trend in the work in progress lies in the creation of new sensors, the improvement of existing ones and the development of very "computerized" numerical measuring systems, which would allow the very short term acquisition of a large number of events as well as the on line calculation of their principal parameters in order to act both on the progress of experiments and on the control of industrial processes, or even on security systems.

The financing of this activity was estimated at approximately 40 million francs in 1980; it is high considering the volume of production, which was 260 million francs as we will see in 1980. This financing is provided by manufacturers (10 percent of the amount of their turnover) and by state institutions (DIELI [Bureau of Electronics and Data Processing Industry], DGRST [General Directorate for Scientific and Technical Research], ANVAR [National Agency for the Valorization of Research], AEC, EDF, etcetera).

Instrumentation for Research Laboratories

In this area, we will cite two examples which show the development of techniques:
- the development, at Berkeley, of an experimental set of 815 detectors to find out the number, the energy and the trajectory of the particles released into space by projectiles hitting the target;
- the development, at CERN [European Council for Nuclear Research], of an automatic calibration system, using a network of optical fibers (175 kilometers of fibers supplied by Quartz and Silice). This system includes 7,000 detectors (scintillators and multipliers).

One can imagine the complexity of the processing of the data provided by these detectors and the need to turn to computer science.

Automatic Operation of Nuclear Reactors

As a general rule, the research and development operations are carried out within the framework of national agreements with three parties (EDF, FRAMATOME [Franco-American Atomic Construction Company], AEC) or international agreements with four parties (EDF, AEC, FRAMATOME, Westinghouse).

Close cooperation has been developed between the EDF, the AEC and the relevant manufacturers (FRAMATOME, NOVATOME [expansion unknown], Merlin-Gerin, Radiotechnique, etcetera). It has been applied recently to studies concerning SPIN [Numerical Integrated Protection System], which has been approved and which will equip 1,300-megawatt power stations; the first industrial system will be installed at Paluel-I in 1982.

Research and developments in progress focus on:
- detectors, especially those placed in the core in order to improve knowledge of the distribution of the neutron flux within it;
- the replacement, in time, of the analog measuring blocks with programmed numerical units allowing a more thorough integration in the protection and operating systems of the power station;
- problems relating to the reliability and the security of the software;
- on-line analysis systems, especially concerning the evolution of fission products, of corrosion, etcetera.

Health physics and radio-prospecting

As far as health-physics installations and appliances are concerned, the research and development work is being applied to solving the very wide range of problems being encountered and to responding to two main objectives:
a) the management of data at a central level in order better to control the functioning of the installations;
b) the direct informing of the workers on the environment in which they work.

Thus, the research and development work in progress is concerned with the improvement of detectors and of the processing of information (microprocessor beacons connected to a central board, introduction of specialized software). Of course, they take into account the scope of our nuclear energy program (health physics in the power stations and in the plants which reprocess the fuel).

As for radio-prospecting, the effort of research and development is directed primarily toward improving the equipment to achieve a more rapid and more precise measuring of the uranium content of ores (special probes for diagramming and ore detectors connected to data processing mechanisms).

Control of Plants

The very significant needs resulting from the expansion of the La Hague plant require a research and development effort to produce numerical measuring chains for the on line control of the processes (concentration and content measurements through gamma absorptiometry, special alpha detectors, etcetera).

Considering the evolution of the regulations, which are becoming increasingly strict in the area of control of nuclear materials, work is being done to improve the sensitivitiy and the security of fissionable material detection mechanisms (gates and beacons), and industrial developments have already been achieved.

Detectors

They play a basic role in all areas and the need to improve their performance is understandable. Important research and development efforts have been undertaken in terms of semiconductor detectors, particularly to allow functioning at room temperature.

Industrial Activities, Economic Data

In terms of turnover, nuclear instrumentation represents approximately 2 to 2.5 percent of that of the total instrumentation in France.

Figure 1 represents the evolution of the French market in the five sectors being considered. This evolution is characerized by:
. A growth of the French market between 1976 and 1980, from 112 to 210 million francs (an increase of 18 percent per year on the average) with, however, a falling off since 1978.
. An equally strong growth in production over the same period of time, going from 150 to 260 million francs (20 percent per year), which can be explained both by the development of the market, but also by an improvement of the rate of coverage of that market through national production (75 percent in 1976 to 80 percent in 1980).
. On the other hand, export performance has evolved less favorably (an increase of approximately 10 percent per year). The share of exported production dropped from 43 percent to 34 percent between 1976 and 1980.

. Finally, overall imports have been contained at an acceptable level (22 percent of the market in 1980), so that, in this field, the balance of foreign trade remains favorable.

Not all sectors perform equally well. Imports and exports are virtually nil in the area of control of reactors and of plants; hence, this is a national market covered by French manufacturers. On the other hand, looking more closely at statistics we are very familiar with, that is to say, those relating to the purchase of materials by the AEC, which are very representative, we find an alarming increase of imports in the sector of instrumentation for research laboratories (a key sector which is essential to the future). Figure 2 provides the evolution of the rate of imports by the AEC and in France. Between 1970 and 1980, these rates went from 8 percent to approximately 35 percent).

Medium-Term Projections of the French Market

These projections (Figure 1, dotted lines) are based on the following assumptions:

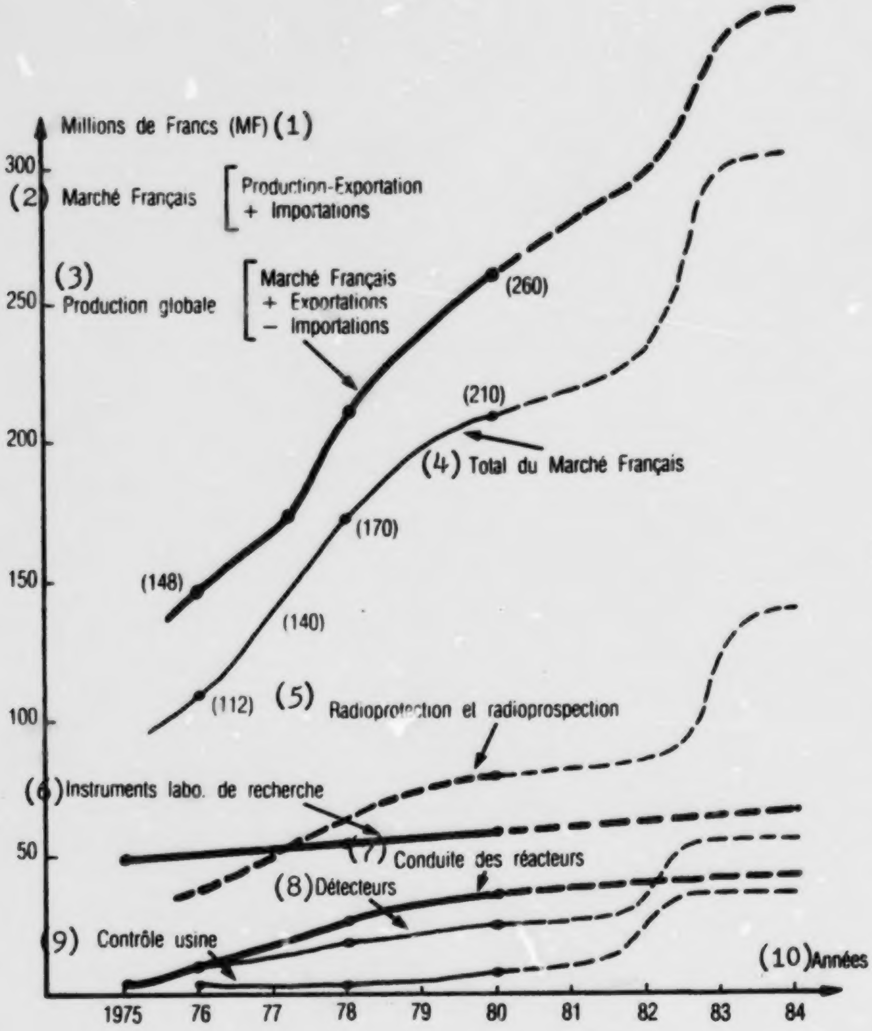


Figure 1. Development of French Market and of Production and Short Term Projections

Key:

1. Millions of francs
2. French market: production - exports + imports
3. Overall production: French market + exports - imports
4. Total of French market
5. Health physics and radio-prospecting
6. Instruments for research laboratories
7. Operation of reactors
8. Detectors
9. Plant control
10. Years

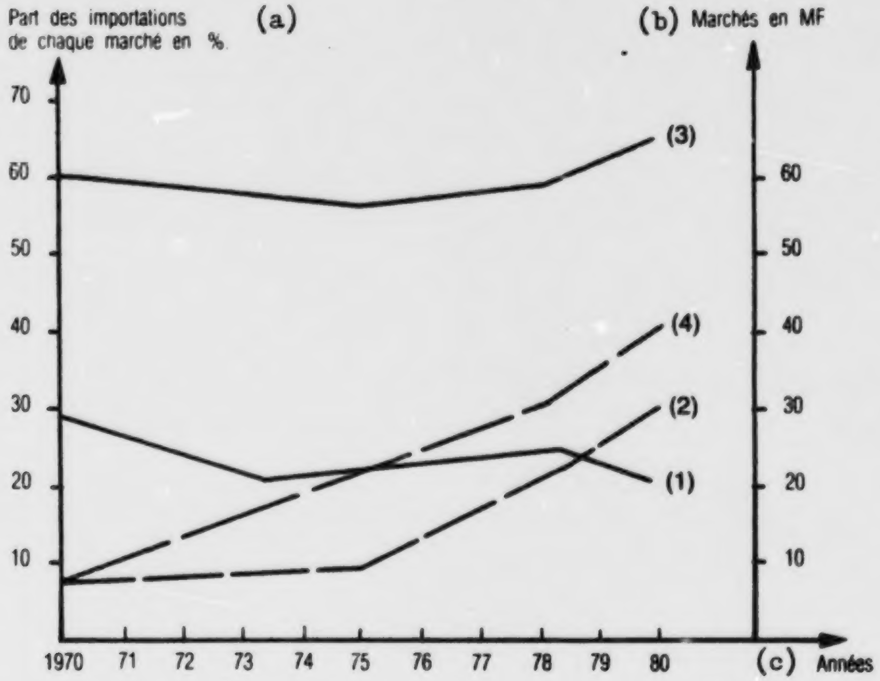


Figure 2. Instrumentation for Research Laboratories

- Evolution of AEC market (curve 1) in millions of francs and of the French market (curve 3) in millions of francs.
- Percentage of imports in both of these markets (curve 2 for the AEC; curve 4 in France).

Key:

a. Portion of imports in each market in percentage
b. Markets in millions of francs
c. Years

. A relative leveling off, in terms of volume, of expenditures for the equipping of power stations at the level reached in 1979.
. Beginning of an enormous effort to equip COGEMA [Nuclear Materials General Company] in 1982-1983.
. Stagnation, in terms of volume, of other expenditures.

The rather strong growth is due to the instrumentation for control of reprocessing plants, to detectors and to health physics.

Even though the projections seem favorable at the industrial level, there is a need to reconquer the French market for research instrumentation and to continue the effort in the other sectors in order to export more. It appears that, in spite of the narrowness of the gap, a national effort based on a European distribution base would be desirable and would be profitable.

A greater effort by the public authorities whose action, even if it is considered too modest, has made it possible to maintain this industry, should be located along the following axes:
. Development of support credits (for instrumentation as a whole, these credits were only on the order of 0.7 percent of the overall turnover in 1979).
. Development of cooperation agreements between research bodies and industry.
. Reduction of our dependence on foreign countries (United States and Japan) with regard to components (integrated circuits, very highly integrated circuits, microprocessors, etcetera).
. Aid specifically to small and medium size enterprises in order to promote innovation.
. Promotion of exports.
. Promotion of training in these sectors.

We will conclude by emphasizing, on the one hand, the unsatisfactory state of nuclear scientific instrumentation, and we have proposed measures to remedy this, and, on the other hand, the always favorable projections of the electronuclear market.

8463
CSO: 5100/2118

CHEMEX OUTLINES ITS URANIUM ENRICHMENT PROCESS

Paris REVUE GENERALE NUCLEAIRE in French Jan-Feb 82 pp 68-70

[Article by J.-C. Guais, head of the Chemical Engineering Section, CEN/Nuclear Studies Center/ Saclay, AEC [Atomic Energy Commission]: "The French Chemical Process for Uranium Enrichment"]

[Text]: 1. General Aspects of the Process

The process is innovative in that it makes practical use of the principle of an exchange between two uranium compounds that impart:

--an elementary enrichment effect to the equilibrium that is more intensive than that obtainable with known (thermodynamic) procedures heretofore;

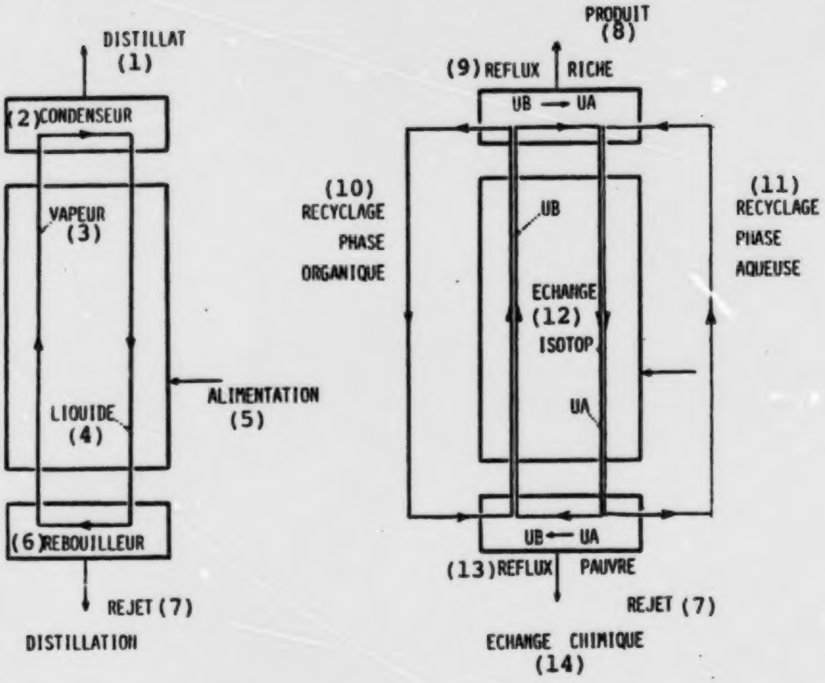
--a speed of attainment of acceptable equilibrium (kinetic), conditioned by the classical phenomena of diffusion of the species in the phases.

Repetition of the elementary effect is obtained by the countercurrent circulation of two immiscible liquid phases, each carrying preferentially or totally one compound.

The skeleton flow diagram of Fig 1 is reminiscent of mass-transfer processes of the distillation or, better yet, of the liquid-liquid extraction types, using exchange contactors of the conventional chemical engineering type (pulse columns), and reflux systems at both ends with an extremely high reflux ratio ($>10^3$).

It should be noted that the exchange operation is a reversible reaction, hence the consumption of energy is reduced to that needed for circulation of the phases, unlike reflux operations in which power requirements are intensive.

The relationship of the CHEMEX [expansion unknown] process to the overall cycle presents some interesting aspects, in that the conversion of the uranium (yellowcake) into the form required by the process is a simpler and less costly operation than converting it into the UF_6 form needed for enrichment by the gaseous diffusion of centrifugal separation processes. Also, the enriched output delivered by the CHEMEX enrichment plant can be easily transformed into UO_2 powdered oxide for the fabrication of fuel pellets.


DISTILLAT
(1)
(2) CONDENSEUR
VAPEUR
(3)
LIQUIDE
(4)
ALIMENTATION
(5)
(6) REBOUILLEUR
REJET (7)
DISTILLATION
PRODUIT
(8)
(9) REFLUX
RICHE
UB → UA
(10)
RECYCLAGE
PHASE
ORGANIQUE
(11)
RECYCLAGE
PHASE
AQUEUSE
UB
ECHANGE
(12)
ISOTOP.
UA
UB ← UA
(13) REFLUX
PAUVRE
REJET (7)
ECHANGE CHIMIQUE
(14)

Key:

1. Distillate.
2. Condenser
3. Steam.
4. Liquid.
5. Feed.
6. Reboiler.
7. Bottom product.
8. Product.
9. Enriched reflux.
10. Organic phase recycle.
11. Aqueous phase recycle.
12. Isotopic exchange.
13. Depleted reflux.
14. Chemical exchange.

Fig. 1 - Skeleton flow diagram of CHEMEX process.

2. Separation Performance

An indicator is used to characterize the specific separation capacity by unit volume of the medium: ΔU_6 in UTS [separative work units]/yr/m^3. This indicator measures in a way the "density of separation yield," which in turn directly conditions the volume of isotopic exchange installation required for a given capacity (separation yield).

It is to be noted that since 1977, when the existence of the process was disclosed at the AIEA /International Atomic Energy Association/ Conference in Salzburg, its specific yield has increased from 70 to UTS/yr/m^3 to more than 200 UTS/yr/m^3, that is, by a factor of 3.

A study of this trend and a knowledge of related thermodynamic, kinetic and hydraulic phenomena justifies expectations of a further evolution in the performance of the process towards an even higher value of this indicator by around 1985.

3. Technology

An important characteristic of the CHEMEX process is that it utilizes a type of technology derived from the conventional industries (chemical, extractive, petroleum), with adaptations to fit the particular characteristics of the process.

Materials

A broad program of testing made it possible to select materials satisfying the criteria of resistance to corrosion, passivity to chemical products, industrialization of the process and costs.

Plastic materials containing fluorine appeared to respond suitably to the cited criteria, either in solid form or as coatings.

Isotopic Contactors

The isotopic exchange takes place in large-sized pulse columns, connected in series so as to obtain the total number of stages needed for commercial enrichment of the product. These apparatuses are designed in widely varying diameters, between 100 mm and 1,200 mm, from the standpoints of mechanical strength, configuration, construction, hydraulics and separation yields.

Components

All the components of a CHEMEX installation were subjected to intensive studies and testing: reactors for the reflux and related operations, pumps, valves and circuits, measurement, monitoring and regulation functions.

4. Plant Design and Industrialization

The design of an industrial installation is based on standardization of all its components and modularization of the capacities to be attained progressively.

In fact, single types of equipment (contactors, reactors, pumps, ...) are used to design commercial units in accordance with capacity requirements:

--The pulse column used as the basic one for its projects has a diameter of 1,600 mm and a height of 30 meters;

--The cascade is a series of 20 columns. It yields commercial-grade enrichment (3-3.5 percent content), with high depletion (bottom-product content close to 0.2 percent). Its capacity is around 250,000 UTS per year, and it is the basic building block for further capacity growth scenarios;

--The module associates two cascades (Fig 2) to form an industrial unit of 500,000 UTS/yr, capable of expansion to meet the evolution of market demand: An increase in the enriched product content to respond to the demand of users wanting to lengthen reactor cycles, or variation of content of the bottom product in accordance with the evolution of prices of natural uranium.

This "flexibility" of the installation is a useful factor, given the uncertainties of the uranium and enrichment markets during the 1990's.

As regards industrialization, it should be pointed out that the use of moderate quantities of apparatus (a few tens to a few hundreds), as well as the emphasis on use of equipment already available on the market (particularly for many of the connected auxiliary functions), tends to do away with the need to create specific industries upstream of the installations, unlike the case of processes such as gaseous diffusion and centrifugal separation.

This explains its modest scale effect; that is, a fairly close economic viability for capacities ranging from 500,000 UTS/yr up to 2-3 MUTS [million UTS]/yr, for example. These characteristics can be of considerable interest to countries at a medium industrial development level and/or having a modest nuclear program.

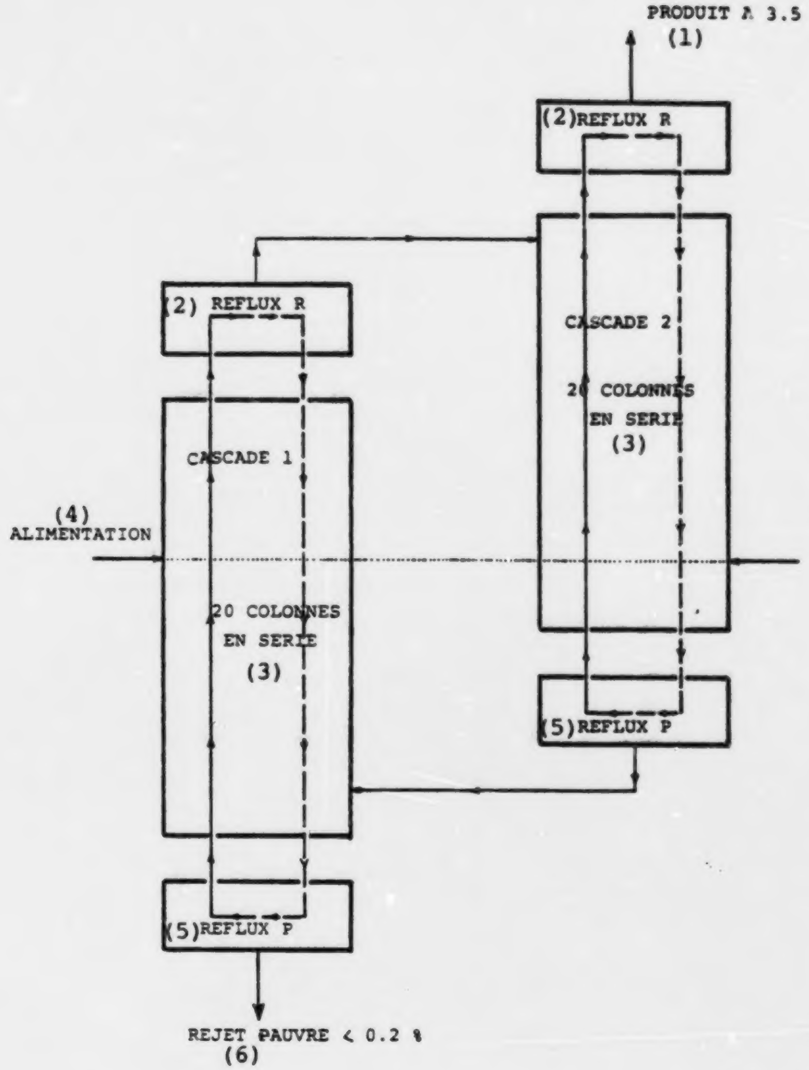
5. A Few Descriptive Details on a 1-MUTS/Yr Plant

For purposes of illustration, a few indicative details are given here for a "basic" 1-MUTS/yr capacity project:

--The plant consists of two modules;

--The total area occupied by the installation is no greater than 10 hectares;

--The plant uses 80 pulse columns 1,600 mm in diameter and 35 m high for the isotopic exchange;


PRODUIT À 3.5 %
(1)
(2) REFLUX R
CASCADE 2
20 COLONNES EN SERIE
(3)
(5) REFLUX P
(2) REFLUX R
CASCADE 1
(4)
ALIMENTATION
20 COLONNES EN SERIE
(3)
(5) REFLUX P
REJET PAUVRE < 0.2 %
(6)

Key:

1. 3.5-percent product.
2. Enriched reflux.
3. 20 columns in series.
4. Feed.
5. Depleted reflux.
6. Depleted bottom product 0.2 percent.

Fig. 2 - Industrial module: Association of two cascades.

--Energy consumed:

--Power requirement: 34 MW(E); that is,a specific consumption close to 300 kW-hrs/UTS, or 8 times less than for gaseous diffusion;

--Thermal energy: 100 tons/hr of low-pressure steam;

--Cooling water: Around 200 m^3/hr if water-cooled towers are used;

--Operations personnel: 300-350 persons;

--The economic analysis, in comparison with the other enrichment techniques, is given in the presentation by Mr Coates (see preceding text).

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OVERVIEW OF CNEN'S NUCLEAR DEVELOPMENT PROGRAM

Rome RASSEGNA PETROLIFERA in Italian 26 Mar 82 pp 279-283

[Article: "An Overall Look at the Thermal Reactors"]

[Text] Light-Water Reactors

The year 1980 was one of profound rethinking of the role and type of activity carried on by the CNEN [National Nuclear Energy Commission]--mainly in the Thermal Reactors Department ("Term")--in the light-water reactors sector.

An organic CNEN policy in this sector was initiated in 1975, with the launching of the Industrial Promotion Program, the objective of which was to support the national industries in the effort to "internalize the licenses" and to maximize the contribution of Italian work in the building of the power plants. The instruments used for activating this program were mainly the "contracts of association" entered into by the CNEN with the country's principal nuclear industries.

Within the framework of these contracts, the CNEN has carried out the double role of evaluation of the "profitability" of the development program proposed by the industry, both in terms of the firms' interest (raising the technological level, increasing market share, adding to defense against the foreign competition; negotiation on more suitable bases of the relationships with the licensor), and in terms of more general interests of the country (improvement of balance of payments; increasing number of job positions; adding to export capacity; higher objective security of the power plants through greater and more intimate knowledge of the power plants themselves) and of participation in carrying-out of activities through the country's own research laboratories.

The logic followed in the establishment of the contracts of association has been that of the "bilateral relationship" between the CNEN and each industry on most of the topics of interest to it. The initiatives taken by the CNEN within this logic are as reported below, with indication of the reactor system involved:

--core system: Consorzio Nuclital AMN (BWR [Boiling-Water Reactor]); SOPREN contract of association (PWR [Pressurized-Water Reactor]); ENEL [National Electric Power Agency] collaboration agreement (BWR, PWR);

--plant: AMN contract of association (BWR); SIGEN contract of association (PWR);

--components: Fiat contract of association (PWR); Breda contract of association (PWR, BWR); Belleli research contract (PWR);

--safety: CISE collaboration agreement (BWR, PWR); Italia-CCR Ispra convention (BWR, PWR).

The personnel of the CNEN and of the industries concerned who were involved in the 1980 program were distributed as indicated in Table 1.

Table 1--Distribution of Personnel

CNEN	Thermal Reactors Department	Other Departments	Total
Association with industries	23	15	38
Activities with ENEL and support activities	121	29	150
Total	144	44	188
AMN			
Fiat (not including Marelli-Terni personnel)			70
Breda (including FBM [expansion unknown]-Ansaldo activities			24
SIGEN-SOPREN			20
FBM-Ansaldo			4
CISE			9
Belleli			12
Total for industries			171
Grand Total			373

As a result of the Fiat-Finmeccanica agreement, which made it possible to start, through unification of the two preexisting groups (for BWR and PWR reactors, respectively), rationalization of the industrial structures responsible for the designing of both types of reactor, the CNEN too has reconsidered its mechanism for taking action in the sector through the Industrial Promotion Program, pursuing the more general objective of contributing to rationalization of the entire supply market.

It is indeed a primary national interest not only to unify the design structure and the product to be built (a single system) but also to identify and define, with programming done as far ahead of time as possible, the specific contributions that the component industries must put out for implementation of the national nuclear program.

In order to achieve this objective, the logic was followed of considering the product or the product family as the aggregating element and of activating, on the basis of a program extending over several years for development of them in the national and international markets, multilateral collaboration between the CNEN and all the principal industries involved in the product considered.

On the basis of this approach, restructuring of the program aimed at development of the following "products" has been worked out and agreed upon with the industries:

--system-oriented designing of the Nuclear Island;
--nuclear boilers;
--fuel loads;
--heat-exchangers;
--instrumentation;
--turbogenerator sets;
--minor components.

The "Management Consortium," composed of the CNEN and the industries involved, and with the participation of the ENEL and of the Sistemista so as to ensure the maximum transparency, on the way toward the activities carried out and toward the results gradually achieved also, has been specified, in a general way, as the instrument for implementing the new type of programmatic approach.

In addition to the abovementioned activities, the program comprises a direct collaboration with ENEL and the national Sistemista for development of the unified project, and finally, a connection with DISP for development of research for the purposes of licensing.

In parallel with the studies and the negotiations on the restructuring of the Industrial Promotion Program, the activities are being carried on within the framework of the existing structures; the principal results are reported below.

Consorzio Nuclital--The activities relative to this consortium, which was liquidated on 31 December 1980, were put, in July 1980, in the CNEN-AMN contract of association, and involved the following concerns:

--development of the thermohydraulic designing of the core, of the fuel and of the experimentation, in collaboration with GE also;

--assistance in the operation of Caorso and collection of data relative to the behavior of the core and of the fuel.

CNEN-AMN Contract of Association

The activities carried out in association have generally enhanced the acquisition of knowledge about the BWR process, in accordance with the specific requirements set by the ENEL, with the objectives of:

a) a gradual transfer to the Italian industry of the "design engineering" activities, for which the licensor or foreign consultants have traditionally been commissioned;

b) internalization and perfecting of the design methodologies that are important for safety, in accordance with the international standard and the specific national standard.

The most significant results achieved are:

--study of jet forces: the study and experimentation activities carried out in Casaccia and at Genoa (Boschetto) have made it possible to take on AMN work commitments equal to 70,000 hours of work, which were initially expected to be assigned to a United States engineering company;

--start of installation of equipment for seismic checkout of components up to 7 tons and with vibration fields on two combinable axes (three in future);

--start-up of experimental program for checking out the containment-atmosphere hydrogen sensors;

--carrying-out of the experimental program at Casaccia on hydroponic cultures for reduction of the surface of the power plants' cooling pools.

CNEN-Breda Contract of Association--The original objective of the program was to enable Breda to maintain and improve its position in the international market as regards the steam-generator component, and more particularly, to improve its knowledge of the products at the level of simple fabrication from the design and under the monitoring of the foreign customer, and to acquire legitimacy through independent development of components and establish a peer relationship with the licensor, as a premise for an active presence in the national and international markets.

The work topics already taken up in the recent years have led to the following principal results, among others:

--for study of the behavior of the steam generator, testing has been conducted at Casaccia on fluid dynamics (Erica circuit), while construction of another two experimental installations (CFA and CPPC), for study of the dynamics and behavior of materials, has been started;

--for development of the components of the steam generator (steam separator, grid), development and testing activities using sizable experimental equipment is in progress, in collaboration with Westinghouse also; this equipment is presently being installed at Casaccia (Aramis circuit) and at the CISE (Gest circuit);

--for fabrication of the steam generator, the technologies-development activities are being carried forward: single-piece extrusion of the steam-generator floor complete with outlets and manholes; various welding methods (hot-wire, submerged-arc, narrow-iron, TIG for different applications (ferrules, outlets, tube plate, etc). [as published]

Within the framework of the CNEN-Breda association, a detailed study has also been completed on the feasibility of an experimental program in support of the development of the supply-water preheater, which will be the subject of a new form of association to be established with Ansaldo-FBM.

CNEN-Fiat Contract of Association--As the general outcome of all the activity so far carried out, Fiat has asserted its capacity to furnish high-technology components, not only on the national market--for which it is especially significant that it is negotiating, among other things, for the supplying of the pumps for the Montalto di Castro power plant (as an alternative to GE)--but also on the international market, in which some interesting prospects, especially for the French program, have opened up.

In 1980, the following results were achieved in particular:

--primary pump: the prototype of the pump is in the assembly stage, and installation of the test circuit, whose components have been made by Italian industries, has been started;

--control mechanism for control rods: the pretesting phase has been started in the circuit for that purpose. The fabrication technologies for all the mechanical components inside the vessel (support plates, grids, guide-tube structures, etc) have practically been perfected. A centralized radiation-monitoring system to be tested out at Saluggia has been finished by SEPA [Society for Electronic Automation] (Fiat), and Gilardini (Fiat) has completed a model of a damper for the primary-tubing connectors.

CNEN-SIGEN-SOPREN Contract of Association--As a general consideration, it should be noted that the activity related to the CNEN-SIGEN-SOPREN association has made it possible to orient and strengthen the small team of technicians working on the topic of the pressurized-water system; this team had been tending to break up because of lack of activity in this specific sector. It has also been possible, on this basis, to maintain and renegotiate a suitable licence relationship with Westinghouse.

The most significant results achieved in 1980 are the following:

--the computer models necessary for the thermomechanical designing of the fuel rods were determined, and a series of expansion and bursting experiments on zircaloy cladding was carried out in the CNEN's laboratories;

--a three-dimensional computer code that does the coupling between neutronic and thermohydraulic variables in core analysis was completed;

--the safety analysis of a PWR installation in case of rupture of the steam channel was established, and a computer model on rapid introduction of boron into the core during a Loca [refrigerant loss] was developed.

CNEN-CISE agreement on collaboration in research activities on the safety of water-type reactors: at the end of 1979, a safety-research program was launched in the CISE, complementing the safety-interest activities conducted by the industrial-promotion program and directed toward objectives indicated by and agreed upon with the DISP, which for this program is tending to take on the position of customer.

The entire program is in the phase of startup and preparation of the experimental equipment; therefore, definitive results have not been achieved yet. The research topics under way relate to: the thermohydraulic behavior of the PWR's pressurizer during transitions, the behavior of a PWR steam generator's nest during transitions, the thermohydraulic transitions of a BWR core and of the primary circuit with malfunctioning of the control system. The experimental program for these activities has been defined through detailed feasibility studies, and the designing of the test equipment is in progress. Another line of activity relates to the studies on the mechanics of fractures. Computer codes have been developed and experimental tests have been carried out for verification and validation of them.

CNEN-ENEL Collaboration Agreement--Within the framework of this agreement, the CNEN has brought together the activities carried out in collaboration with its system-oriented industrial partners (AMN and SOPREN) relative to development of the fuel and of the core. Through the CNEN it has therefore been possible to achieve a very productive relationship of collaboration between industry and ENEL--collaboration that in the past had proved difficult because of the reciprocal "supplier" and "customer" position.

The principal themes of the collaboration have concerned the collection of data from the operating of Caorso; preparation of experimental fuel elements; development and certification of computer codes for description of core behavior in stationary conditions and incident conditions by means of models that are alternative or that integrate the license models.

Research Contract with the Belleli Company--The contract is aimed at development of heat exchangers made of low-cost thermoplastic material, to be used in wet-dry cooling towers with forced draft to be used for power plants located at sites with limited water availability.

Several solutions for construction problems with the exchanger have been optimized so far, and modification to wet-dry of a tower operating wet has been completed; collection of the experimental operating data for this tower is in progress. Processing of the data may verify the design hypotheses. The first obvious result has been abatement of the exhaust fumes.

A large proportion of the financing for the Industrial Development Program has been used for building a series of test circuits, equipment and special machinery that in toto represent a large investment at the national level. This equipment has been concentrated in experimental areas that are located mainly in the major users' establishments but are planned to be capable of use in a centralized manner to the benefit of all interested national operators.

Within the framework of the Industrial Promotion Program, the CNEN is also conducting activities not directly included in the collaboration agreements with industry but in reality closely purpose-directed toward the activities of the contracts. They generally involve programs oriented toward safety topics and directed mainly toward study of separate effects and basic phenomenologies that result in knowledge broadly usable for both of the systems.

In particular, the international-cooperation activities relative to the behavior of fuel-element models under irradiation are being carried forward. These activities are being conducted by the CNEN, AGIP [National Italian Oil Company]-Nucleare, AMN and SIGEN-SOPREN on a collaborative basis.

Heavy-Water Reactors: Cirene Prototype

The activities relative to the construction of the Cirene prototype were carried forward on a regular basis in 1980. On the level of general project management, two notable events occurred:

--the contractual relationship with the NIRA [Italian Nuclear (Company) for Advanced Reactors] was updated in order to take the increased design commitments into account and to define the modalities of reimbursement for the installation activities, on the assumption that the loading of the fuel into the reactor will take place in 1983;

--a new structure was adopted for the ENEL organization that carries on the ordering activities.

The action of the overseeing authorities was continued, both for the purposes of approval of the Detailed Design Reports and for implementation of oversight of the components and systems being built; recourse to the specifications-fulfillment certification procedure was limited to the absolutely necessary cases only.

The state of advancement of the work can be summarized as follows:

--the Nuclear Island design activities are close to completion, though the safety analyses and the programs for the operational software for the reactor supervision and control systems are continually updated. As regards the conventional part of the installation, the analyses of the buildings and the writing of the order specifications for the systems are in progress;

--deliveries: almost all of the orders for the systems and components of the Nuclear Island have been made, and construction work on the Nuclear Island has reached an overall average of more than 35-percent completion; some of the principal components (primary pumps, steam compressors, control system) are close to the final checkout phase. As regards the conventional part, the construction work on the turboalternator set and the condenser, which are the components that take the longest time to deliver, is in progress at Ansaldo. Table 2 lists the principal items ordered from Italian industry;

--civil-engineering work: the upper structures of the two most demanding buildings of the Nuclear Island (the reactor building and the pool building) are under construction; they have been set on deep foundations;

--state of authorizations: 20 of the 22 Detailed Design Reports into which the installation has been subdivided have been presented to the CNEN's Central Department for Nuclear Safety and Health Protection (CNEN-DISP), and 11 of them have been approved; since only a few of those not approved yet are of considerable complexity, the state of advancement of the authorization procedures, as regards the design aspects, can be estimated at about 70 percent;

--research and development: the design-support and construction-support activities have reached their concluding phase; the studies of greatest importance that are still in progress have to do with full-scale checking of the behavior of the fuel column under vibration, and the maintenance of the installation.

The principal work done in the various areas of activity in 1980 are illustrated below.

The design work has progressed satisfactorily in its various articulations. In the civil-engineering sector, working drawings for the reactor building have been prepared (65-percent completion), as well as those for the waste-pool building (30-percent completion), while the operational project (including the stress analysis) for the control-room and diesel buildings is in an advanced stage of preparation; the geotechnical study for the foundations of the remaining buildings has been completed, and studies and checks of the structural stability of the buildings themselves have been conducted.

Table 2--Principal Italian-Industry Suppliers for Cirene

Supplier	Item	Order Date
Ansaldo	Turboalternator and condenser	October 1979
	Sequence and interblocks	November 1980
ATB	Cylindrical body	September 1977
Belleli	Metal container	February 1978
	Heat exchangers	May 1980
	Mechanical assemblies	October 1980
Breda Termomeccanica	Reactor assembly	February 1974
	Power channels	March 1978
Castagnetti	Solidification of radioactive wastes	June 1979
Cimi	Metal container floor	September 1974
	Water containment system	September 1974
CMI	Fuel-exchange system	February 1979
Dalmine	Tubing	October 1979
Fiat	Fuel transfer and storage system	April 1980
Hartman Braun Italia	Neutron instrumentation	May 1980
Massobrio	Inserts for civil-engineering work	November 1978
Nuovo Pignone	Startup compressor	December 1977
	Primary safety valves	February 1979
	Control valves	July 1979
Riva Calzoni	Tube-closing plugs	November 1980
	Components for fuel-exchange system	November 1980
SCAI [expansion unknown]	Non-nuclear tanks	August 1979
SEPA	Radiation monitoring system	August 1980
Zanon	Biphase rods	December 1979
	Heat exchangers	July 1979
Zerbinati	Overhead traveling crane for handling containers	March 1980
	Protective doors	October 1980

As regards the fluid systems, conclusive analysis of the tubing of the primary heat vector and its auxiliary equipment has been carried out; the contract specifications for almost all of the components have been issued; the plant layout has been defined; and the detailed designing of the ventilation system has begun.

The designing of the electrical, firefighting and communication systems has been completed; for the protection, instrumentation and monitoring systems, the contract specifications for the principal components have been prepared and preparation of the operational programs for the direct digital-control system has been started; and the neutronic and thermohydraulic design of the core and the thermomechanical design of the fuel, substantially completed in 1979, have been subjected to detail checks.

In the area of supplies, the principal orders placed in 1980 were those for the electrical panels, the nuclear-instrumentation system, the radiation-monitoring system and the sequence and interblock system; and the invitation to bid on the gaseous-effluents discharge installation, the ordering of which is planned for Spring 1981, has been published. The work is behind schedule in some cases, either because of the difficulty of obtaining, even in the international market, electrical and instrumentation components that meet the qualifications set out in the IEEE norms applicable to Cirene, or because of the complexities in application of the quality-assurance program, or because some Italian suppliers are producing components for the nuclear market for the first time.

The activity relative to the awarding of the principal installation contracts began in 1980 also: in particular, the contract for prefabrication and installation of the tubing and for installation of the mechanical equipment, and the contract for the raising of the big components, have been awarded. During the year, the civil-engineering work relative to the reactor and waste-pool buildings continued without a break: the foundation slabs for the two buildings were laid in the first and third quarters of the year, respectively, and installation of the bottom liner of the reactor building's metal safety container was installed in the second quarter; the concrete heat shield overlying the bottom itself was installed at the same time.

Following that, the construction work on the upper structures could begin, and its state of advancement is as follows: for the reactor building, the external annular galleries have been completed and the upper vertical structures inside the primary container were started, while for the waste-pool building, the upper structures in the pool zone only are at an advanced stage of construction.

In addition, the laying of the poor concrete up to the foundation slab of the connecting body between the reactor building and the turbine building has been completed.

During the second half of the year, the prefabrication, at the base of the structure, of the water-containment tank of the Reactor Assembly was done, and an installation test of the whole--which is quite complex, being composed of the tank itself and of the armatures and inserts of the concrete biological shield, which surrounds it--was started.

Within the framework of safety activity of obtaining of permits [as published] the issuance of 20 Detailed Design Reports (RPP) out of the total of 22 planned has been completed, while the approvals related to them are proceeding at a rate slower than planned; in the first half of 1980, two (for the sprinkler system and the control-room building) were approved, and one at the end of the year (the control-room ventilation system), bringing the total number of RPP's approved so far to 11.

The 1980 research and development activity in support of construction of the prototype involved the definitive checking-out--for safety-analysis purposes also--of several design solutions adopted, transfer to the industrial level of the knowledge acquired in the laboratory, checkout of supplies of preseries components that will be installed in the reactor, and finally, identification of knowledge and techniques that will be useful for solving the problems of operation of the prototype.

With these end-purposes in mind, the drops of pressures and densities in biphase mixtures flowing in low volumes in large-diameter tubes have been determined, in the area of thermohydraulics; in the field of mechanics, the tests of behavior and duration and the Zircaloy-steel connection of the power channel have continued, the procedures for replacement of the insulation tubes during the initial installation phase have been defined, a preliminary investigation has been made of the procedures for replacement of insulation tubes in the initial installation phase [as published], a preliminary investigation has been made of the procedures for inspection of the Cirene channels, development of an acoustical-broadcasting system for signaling small breaks in the feeders has continued, and finally, the technique for formation of ice plugs for isolating circuit sections on which maintenance work is to be done has been experimented with on a small scale.

In the area of dynamics and control, the checking-out, in the pile, of the fission microchambers to be used in the core instrumentation has been completed, and the results of the tests for determining the limits of stability of the channels in parallel during the startup phase have been worked up.

On the topic of safety, experimental analysis of the temperature reached by the fuel under conditions of refrigerant loss ("Loca") has been completed, and a final document on the effects of a hypothetical bursting of the pressure tube has been prepared.

In the area of chemistry, several decontamination techniques have been checked out, and the collection of data relative to corrosion of carbon steels in various environments has been completed.

On the topic of the fuel, the irradiations in the Cart di Essor circuit in the Halden reactor for the in-pile qualification tests of rods and bundles of the prototype, both under stationary conditions and in power rises have been completed: for the execution of these last-mentioned tests in the NRX reactor in Canada, a test ring was constructed and the rods already irradiated were transported from Halden to Chalk River. Construction has been completed, and operation of the experimental circuit designed for the verification tests has begun.

Updated estimates of the times for completion of the prototype indicate starting of the loading of the fuel into the reactor in Spring 1984.

Many interacting causes have produced postponement of the target dates: some are of a financial and programmatic character, occasioned by uncertainty about the availability of the necessary financing; others are of an organizational and management nature (quantitative shortage of CNEN-DISP structures assigned to licensing, pressing commitments in the Ordering units regarding the nuclear and conventional power plants, limitation of CNEN personnel participation in these activities); and others, finally, involve the operational area (unforeseen technical difficulties, or difficulties arising from application, for the first time in Italy, of the most recent norms on licensing and on the quality-assurance program).

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END

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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 146

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27 May 1982

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NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 146

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BRIEFS

CANADA-EGYPT NUCLEAR AGREEMENT--Canada and Egypt have signed a 30-year nuclear cooperation agreement. At a news conference in Ottawa, Federal Energy Minister [title as heard] Marc Lalonde made it clear that the agreement simply opens the door to future discussions on the development of nuclear energy for peaceful purposes. Mr Lalonde and his Egyptian counterpart, Mahir Abaza [name as heard], who is in Ottawa to sign the agreement, told reporters that pact marks another important step in increasing relations between the two countries. Among other things, the deal may include the possible sale of Candu nuclear reactors, the supply of uranium, implementation of joint nuclear research programs and the exchange of technology. [Text] [LD171950 Montreal International Service in English 1900 GMT 17 May 82] The agreement also provides for the exchange of experts and the training of Egyptian experts in the fields of security and safety systems for nuclear power stations and environmental protection. Canada will provide Egypt with assistance in prospecting for nuclear raw materials, such as uranium, and development of these resources. [Excerpt] [NC171559 Cairo Domestic Service in Arabic 1400 GMT 17 May 82]

CSO: 5100/2170

'EXPRESS' REVIEWS PERILS OF S. ASIA NUCLEAR RACE

BK091240 Delhi INDIAN EXPRESS in English 26 Apr 82 p 6

[Article by Pran Chopra: "Our Nuclear Nightmare"]

[Text] If some recent discussions in New Delhi are any indication, the current conventional arms race between India and Pakistan will first worsen, and then escalate into a nuclear arms race not many years hence. It is ironic that this prospect should begin to crystalise so soon after the two countries appeared to be so close to discussing a non-aggression agreement. But while the very prospects of peace might have sparked warlike thoughts among some quarters in both countries, quarters whose own interests are best served by mutual tension, the nightmare of nuclear competition between India and Pakistan has begun to look unavoidable even to those who ardently wish the two countries would foreswear the use of force in settling any dispute between them.

Two seminars have been held in New Delhi in recent weeks, one on the general theme of India's security environment, and the other more specifically on India's nuclear options. The participants in both included some of the more thoughtful among our former and present politicians, administrators, academics, journalists, recently retired but very senior men of the armed forces. Some participants had held top positions in the conduct of wars in which India first defeated Pakistan and, the next time round, dismembered it.

While at both seminars there was the inevitable diversity of opinion on nearly all matters, two basic propositions were opposed by no one and supported by everyone who spoke about them. First, India should make it plain to Pakistan, and to everyone else, that next time it is attacked by Pakistan, India will not stop the war at a time of Pakistan's or anyone else's choosing. It will wage it as long as it thinks it necessary for making Pakistan incapable of waging another war. It was contended by some participants that with the help of sophisticated weapons acquired from the U.S.A., Pakistan might gain initial advantage in a surprise attack. If international pressures then brought the war to a quick end, Pakistan would be able to retain the gains. Therefore, everyone agreed that next time India must fight as long as it took it to mobilise its war potential in depth and then destroy Pakistan's offensive capability for good.

The second point of near unanimity was that should Pakistan go nuclear, no party and no government in India would be able to resist the demand that India must go nuclear too. Many participants said so more in sorrow than anger, reluctantly accepting this conclusion as a hard fact of political life. But many others urged it as the logical corollary of the consensus that if there was another war, India must fight it to the finish. They argued successfully that if Pakistan had nuclear weapons, even if only a few, and India had none, then Pakistan would be tempted to try to exploit its greater sophistication in conventional weapons to make a quick grab of some Indian territory, say in Kashmir, and then rattle its bomb to scare India out of making a counterattack.

From this point it follows inevitably that just as in conventional so in nuclear weapons, India must maintain a telling superiority over Pakistan, and for the same reason, deterrence. India's superiority must be so great, and must be seen to be so great by Pakistan, that Pakistan would dare not try any adventures against India. If it is true of a conventional Pakistani attack that it is better prevented than punished, it is even more true of a Pakistani nuclear attack that it is better deterred than rewarded with overwhelming retaliation. It would not be hard for India to absorb the damage Pakistan may inflict in a surprise attack with conventional weapons. But a surprise nuclear attack can cause so much damage that even the subsequent destruction of Pakistan would be poor comfort for India. Therefore, a nuclear attack must be deterred with an even more overwhelming nuclear superiority. But, of course, it also follows with equal inevitability that, just like the two super powers, in a tragic parody the two puisne powers of South Asia will also push each other into the MAD [mutually assured destruction] doctrine of defence: mutually assured destruction as a means of achieving some kind of a no-war relationship which passes for peace.

Exploring the nuclear theme a little deeper, the costs of this inevitable escalation stood out horrendously. Some of the papers prepared for the seminar by the Centre for Policy Research show that the costs, though difficult to calculate, are crippling by any reckoning. The papers do not represent CPR's views. In fact, CPR has none; the purpose of the papers was only to distill present knowledge on various aspects of the subject and to underpin the discussion thereon with this information. But they do bring out, and so did the greater part of the discussion generated by them, how ruinous the costs can be as India and Pakistan continue and escalate their confrontation.

One paper shows that for a not very ambitious nuclear arsenal ("a rather small one," the paper calls it), an enormous cost has had to be borne by France, a country whose example is particularly relevant to India because, as the paper points out, "France had no help from anyone in developing its deterrent," as will be the case with India, too. "Between 1955 and 1980, France spent approximately U.S. $20,000 million to achieve a force of approximately 120 strategic launchers" and was expected to have spent $4 billion more in 1981 alone. In completing its programme for this force through 1995, France will end up with a bill of $60,000 million. To achieve a similar nuclear capability, India would need to spend the equivalent of $75,000 million in the next 15 years because it would have to start from a lower technological base. This means the budget for nuclear defence alone for the next 15 years would be U.S. $5,000 million, or just under Rs 5,000 crore a year, which is equal to the present, significantly stepped up, annual defence budget.

The theoretical calculation is sometimes made that for each billion invested in them, nuclear weapons can inflict more damage on the enemy than conventional weapons can, and therefore are most cost effective. But the papers and arguments presented at the CPR seminar shot down any expectation that investment in nuclear weapons would mean any saving in the expenditure on conventional weapons. No country has been able to reduce expenditure on conventional weapons for the reason merely that it has gone in for their nuclear cousins. And this for the very simple reason that in the given international climate, it is awfully difficult for any country to give a nuclear riposte to a conventional attack and thus become the first country to use the nuclear bomb after World War II.

Even the United States, which had already lost its virginity at Hiroshima, had to accept stunning reverses in North Korea, and that too at the hands of (at that time) a non-nuclear China, and had to accept humiliating defeat from a non-nuclear Vietnam, rather than win either war, as it could have by using the nuclear bomb. Therefore, as long as the scenario of our relations with Pakistan is presided over by war, superiority over Pakistan in conventional weapons will have to be maintained irrespective of the superiority obtained (if it is) in nuclear weapons.

This has enormous implications for India, first financial and then, as a consequence, security-wise. If some friends of Pakistan can keep stoking up Pakistan's arms arsenal, and if India continues to succumb to the temptations of escalation -- and I too do not see what else India can do so long as relations with Pakistan continue to be what they are -- the defence drain on India's economy will continue until first the economy is ruined and then security lost as a consequence. Those who wish to see India weakened will thus achieve their aim better by this indirect means than they could in the past by more direct means.

India faced the same danger in relation to China in 1962 but, fortunately, overcame that; she is not in a conventional or nuclear arms race with China. But India will never drop out of an arms race with Pakistan. Therefore, defence will remain an open wound in the Indian economy as long as Pakistan is able to keep it open with the help of others. That, in the process, Pakistan itself will become a slave of some money-lender will be of little comfort to India.

I wonder, as also does one of the working papers placed before the CPR seminar, whether in the midst of our rejoicing over the Pokharan explosion, or in the midst of the subsequent inaction in nuclear development, we thought the consequences through. If the Pokharan explosion had not occurred, Pakistan would not have been spurred on the nuclear path and a nuclear race between the two neighbours would not have ensured. Alternatively, if immediately after Pokharan, India had quickly assembled a credible arsenal, Pakistan might have been deterred out of entering a race, just as India has not entered into a race with China, knowing that the gap is too large to close.

The contrary view advanced by some Indian experts is that since Bhutto began to talk about a Pakistani bomb two years before the Pokharan explosion, and called it Islamic, Pakistan's nuclear ambitions belong to a content different from and wider than the subcontinental and are not focussed upon India. This logic is too clever by half. The nuclear debate began in India immediately after China exploded its first bomb in 1964. Within a few years it became common knowledge that India had acquired some sort of nuclear capability. A neighbour who wanted to react did not have to wait for Pokharan. If Bhutto chose to call it Islamic it was only to make the programme more fundable by the Arabs, not to reassure us. I find it strange that the same people in India who insist that Pakistan is acquiring the F-16's only for use against India also argue that Pakistan's nuclear aspirations are not India-oriented. The purpose of this sophistry I do not know, except if it be to say indirectly that since its nuclear focus lies elsewhere, Pakistan will not barter away its bomb against India's. Is this an attempt to preempt such case as there may be for a no-bomb pact with Pakistan?

The case for such a pact is, in all conscience, very feeble. But if there is a case it has to be explored with the few years remaining before Pakistan also stages an explosion or whatever else. Once it does, the die will be cast. Theoretically, there will be room even then for arguing that the two countries should reach a nuclear force levels agreement, instead of chasing each other up the nuclear escalator until both fall down dead. But their failure to reach such an agreement even on conventional weapons, in which the problems of trust and the costs of misplacing it are much less, does not augur well.

CSO: 5100/2171

BRIEFS

CANADA BLAMED FOR FAULTY EQUIPMENT--New Delhi, 10 May (AFP)--Indian nuclear scientists have accused Canada of supplying defective equipment for the Rajasthan atomic energy plant in north-west India, which has had 251 breakdowns since its commissioning nine years ago. "Canada has indeed done its (?experiments at the cost of) India," the Indian news agency UNI quoted the scientists as saying in a report published today. They said the recurring trouble at the Rs. 1,650 million (about 183 million U.S. dollars) plant might plague it for all its life unless drastic changes were made. The plant's equipment was supplied by Canada under an agreement with the Indian Government. The 440 megawatts plant, which has never worked at more than 60 percent of its capacity, was shut down indefinitely on March 4. The latest trouble in one of the two units has been ascribed to leakage in one of the operational tubes. [Text] [BK111715 Hong Kong AFP in English 0600 GMT 10 May 82]

CSO: 5100/2171

BRIEFS

KOZLODUY STATION CAPACITY INCREASES--Sofia, 18 May (BTA)--The fourth power block of the Kozloduy atomic electric power station has been put on stream. With the new 440 megawatt the total capacity of the station became 1,760 megawatt. The Kozloduy atomic electric power station which in 1974 sent on the power lines of Bulgaria the first atomic electric energy, is one of the biggest sites of Bulgaro-Soviet technical cooperation. This cooperation started already with the designing of the first capacities of the station and continues till the present day--with the construction of a new 1,000 megawatt reactor. Atomic power generation is defined as one of the main trends of development of the Bulgarian power economy. Now the Kozloduy atomic electric power station holds one-fifth of the total energy output in Bulgaria. According to forecasts, in the future this share will be increasing. For her own energy base and for the needs of the other CEMA countries Bulgaria has already specialized in the manufacture of a specific kind of equipment for atomic electric power stations. [Text] [AU181940 Sofia BTA in English 1836 GMT 18 May 82]

CSO: 5100/2170

USSR'S ANTONOV VISITS NUCLEAR CONSTRUCTION SITES

Dukovany, Jaslovske Bohunice Visited

LD181926 Prague Domestic Service in Czech 1630 GMT 18 May 82

[Text] Aleksey Antonov and Ladislav Gerle, nuclear energy cooperation plenipotentaries from the Soviet Union and Czechoslovakia, visited the construction site of the nuclear power station at Dukovany today. They acquainted themselves in detail with the progress of the power station's construction; the first power unit is to be commissioned in September 1983. Comrade Aleksey Antonov noted that the project is being built according to high standards and on a broad scale.

From Dukovany Comrades Aleksey Antonov and Ladislav Gerle went to Jaslovske Bohunice. They were interested in the current progress of the construction of the decisive building and assembly sections of the V-2 nuclear power station. They also assessed the future progress of construction and emphasized that it is necessary to strengthen the building and assembly capacities and to organize work on an around-the-clock basis.

Nuclear Cooperation Agreement

LD182100 Prague Domestic Service in Czech 1930 GMT 18 May 82

[Text] The deliberations of the plenipotentaries of the governments of Czechoslovakia and of the Soviet Union devoted to implementing the program of cooperation in nuclear energy ended in Prague today with the signing of a protocol. Deputy Premier Ladislav Gerle and Aleksey Antonov, deputy chairman of the Council of Ministers, discussed the main questions connected with the gradual completion of the projects now under construction and with preparations for the construction of further energy projects. The protocol defines in concrete terms measures for the completion of the energy units in the power stations at Jaslovske Bohunice and Dukovany and covers cooperation in the design of the nuclear power stations at Mochovce and Temelin.

CSO: 5100/2170

FUTURE DEVELOPMENT OF NUCLEAR POWER INDUSTRY OUTLINED

Warsaw TRYBUNA LUDU in Polish 21 Apr 82 pp 1, 2

[Report on interview with Deputy Premier Andrzej Jedynak by Slawomir Popowski, PAP journalist, prepared by (ak)]

> [Text] In connection with the Council of Ministers resolution, passed in January of this year, on beginning the construction of the first Polish atomic power plant in Zarnowiec, PAP journalist Slawomir Popowski conducted an interview with Deputy Premier Andrzej Jedynak.

The program for the development of the nuclear power industry, the deputy premier said, is being considered as a part of the total program of the development of the power industry in Poland to the year 2000. At present the basic variant is being considered, in which it is envisaged that 10,760 MW of generating capacity will be installed in nuclear power plants by the year 2000, and the potential of expanding this program by an additional 4,000 MW is also being investigated. Thus, in the 1990's the nuclear power industry should ensure half the increase in new power output. This program is technically realistic, although lower in relation to our needs than the possibilities that arose within the framework of CEMA through the guaranteeing to us, during 1981-1990, of deliveries of fuel and equipment for nuclear electronics not produced in Poland.

A decision has now been made to build two power units, 440 MW each, in Zarnowiec, by 1990. At the same time, we will participate in the construction of a nuclear power plant in Khmel'nitskiy, in the USSR, as a result of which, beginning in 1984, we will receive electric energy, initially in an amount equivalent to 200 MW output, until a level of 1,000 MW is reached in 1988. In addition to the Zarnowiec power plant, the locating of the next one, "Kujawy", in the Wloclawek area, is being considered. Four power units rated at 1,000 MW each, would be installed there. Deputy Premier A. Jedynak said that atomic energy is an essential and single source for satisfying the country's energy needs during 1990-2000 and later. The nuclear power plant construction program mentioned will make it possible to replace approximately 30 million tons of hard coal annually and relieve the burden on transportion. It should also be borne in mind that our hard coal resources are limited, and mining them is and will be more and more difficult (depth of the mines, working conditions, etc.) Brown coal is, certainly, a big help, but it is not an unlimited source of fuel. Nor should we overlook the adverse affects that the exploitation of these deposits has an agriculture.

In answering questions on the dangers of atomic energy, the deputy premier said that human exposure to radiation, research has shown, is less than 1 percent of the exposure to natural radiation (cosmic radiation, natural radioactive elements) and that applied in medicine (radiological research). It is also a fact that the few failures that occurred during the over 25 years of operation of industrial nuclear power plants (at the end of 1981 there were 266 power units with a combined capacity of 148,477 MW in operation), did not cause even one case of a threat to life through radiation to the service personnel in these power plants or to persons living in the area of these plants.

The entire nuclear industry in all countries of the world was, from the beginning of its existence, subject to very severe, detailed technical requirements as to materials used, technologies, design, and finally, operation. The investment process, i.e., siting, designing and construction of a nuclear power plant, is subject to strict regulations and is supervised by the investor on one hand and by an independent state organization on the other hand. In our case, the investor will be the Ministry of Mining and Power Industry, and supervision, from the standpoint of safety, will be exercised by the State Atomics Agency. That is why, among other reasons, this Agency was recently formed. Only after a safety report is approved will a license be issued for the construction and startup of a power plant. The personnel undergoes special training before it is permitted to go to work. The safety regulations in effect in CEMA and now being prepared in Poland are, of course, in accordance with those of the world regulations. From the technical standpoint, of greatest importance is the fact that every nuclear power plant reactor is equipped with multiple, automatic-operation safety systems.

These strict performance and operation requirements, applied consistently, are responsible for the fact that the nuclear power industry is regarded universally as the safest subsector of industry. The matter of nuclear power plant radioactive wastes also has been fully resolved. These are wastes which are processed entirely by controlled technologies and are stored under supervision in storage facilities. Studies are now being conducted in Poland on the selection of the type and location for storage facilities for these wastes.

The Council of Ministers' recent resolution, dated 18 January of this year [1982], was passed with the full awareness that the construction of a nuclear power plant in Zarnowiec, as the beginning of Polish nuclear power, is essential. Undertaking it during such an economically difficult period attests to the importance that the Polish People's Republic's government attaches to the development of the Polish power industry, and we must bear in mind that is the basis of our entire economy, and that its planning will require many years of lead time. The Ministry of Mining and Power Industry, which is in favor of building this power plant, has already begun work on organizing the construction of the first power unit in Zarnowiec. The 1989 target date for startup of this unit is realistic.

Further information obtained from the deputy premier reveals that the first power reactor will be of the pressurized-water type, i.e.. one in which the medium receiving the heat generated as a result of the controlled nuclear reaction, is ordinary water under pressure. This same system is being used as basic equipment in nuclear power plants in the CEMA countries (half of the active reactors in the world operate on this principle). The first power reactor of this type, with a generating capacity of 440 MW, has already been operating for years in the USSR, Bulgaria and Finland, and a similar one is being built in Czechoslovakia and Hungary. This is an efficient power unit with a well-developed technology, construction of equipment, and operation. Thus the construction of such power units, as the first, is most justified. Using these units we will be able to more easily master this much more difficult, in comparison with the engineering used in the past, construction of a facility and equipment, and then the actual operation.

At present the Soviet Union, within the framework of CEMA, is building larger and more modern power units, also water-pressure, rated at 1,000 MW. The first such power unit is already operating in a power plant in Novovoronezh, and the following ones are being built in the already mentioned Khmel'nitskiy nuclear power plant. These types of power units are also expected to be built in the next Polish nuclear power plants.

Poland, despite the fact that it entered this field late, has already made, and is making a contribution to the building of nuclear power industry in the socialist countries and, obviously, in our own country. In the distribution of deliveries, Poland produces, or is beginning to produce equipment for the 440 MW power units. Their production is based mainly on documentation furnished by the Soviet Union, however, in many cases, the Soviet specialists and ours cooperate closely in improving and modernizing the construction. In addition, the development of the production of nuclear equipment by our industry within the framework of a multilateral agreement of the CEMA countries, assigns us the specialization of production and much of the equipment for the nuclear power industry. Their export, in turn, makes it possible for us to receive deliveries of other indispensable equipment and materials.

This is a long-range problem which we must consistently implement, for it serves not only the nuclear power industry. The new materials and technologies developed for the nuclear power industry are immediately applied in the chemical, machinery, and other industries. Such was, and is, the incidental, but so very important, role of the nuclear power industry in the whole world. It is the proverbial lever of technical progress in every country.

9295
CSO: 5100/3017

BRIEFS

OFFICIAL DISCUSSES NUCLEAR PLANS--Buenos Aires, 15 Apr (TELAM)--The advisor of the National Atomic Energy Commission (CNEA), engineer Jorge Constantino announced here today that Argentina anticipates putting into operation another nuclear plant, possibly in Mendoza, in 1991, but he made it clear that the decision on the subject will be made next year. The official also stated that the Argentine nuclear plan also contemplates the installation of other nuclear plants by 1995 and 1997. Constantino made these statements at the Ezeiza international airport, shortly before leaving for Rio de Janeiro, where he will take on the position of president of the Latin American section of the American Nuclear Society. He then recalled that our country is in an intermediary position in the nuclear field and pointed out that Argentina is in this respect in the same level as Brazil and Mexico. [Text] [PY152132 Buenos Aires TELAM in Spanish 2105 GMT 15 Apr 82]

CSO: 5100/2168

NUCLEAR WASTE TO BE STORED AT ANGRA-I SITE

Rio de Janeiro JORNAL DO BRASIL in Portuguese 11 Apr 82 p 26

[Text] The atomic waste of Angra-I will be kept in a large storehouse at the plant site itself, according to the announcement made yesterday by the chairman of the National Nuclear Energy Commission (CNEN), Hervasio de Carvalho. The announcement puts an end to a succession of speculations, semiofficial announcments and denials that included as sites chosen for the reactor's radioactive waste the municipality of Xerem in the Fluminese Lowland and islands off the Atlantic coast.

All the radioactive material--exchanged water, replaced parts, tools, clothing, gloves and everything that has come into contact with radioactivity--will be put into large ironclad reinforced concrete drums which will be kept in sheds. According to the CNEN chairman, the site chosen at Angra is capable of accumulating the plant's waste for 15 years.

Common Method

Storing the atomic waste near the plant itself is a common technique in many countries, such as in Japan "where there is a special sensitivity surrounding the nuclear issue because of Hiroshima," explained Hervasio during yesterday's visit to the Brazilian Nuclear Corporation (NUCLEBRAS) by the German president, Karl Carstens. Other possibilities are: to take the waste to deserted places or to cast it into the ocean trenches, inside perfectly sealed drums.

The technique chosen for Brazil--at least for the Angra-I waste--is well known to CNEN technicians, said Hervasio. He said that the CNEN and NUCLEBRAS had conducted a number of tests in Belo Horizonte, all of them recorded on videotape.

"In this phase, still operating at low power, Angra-I is still generating an insignificant amount of radioactivity," declared the CNEN chairman. In addition, he explained, the radioactive content of the material stored decreases with time and can drop to a quite low intensity. "An important factor is to use water of the highest quality in the reactor, demineralized water, so that radioactivity will not be produced in the impurities."

Physicist Criticizes

"I doubt that the site selected responds to all of the safety rules for the storage of radioactive wastes. Some of the conditions were certainly fulfilled but I doubt that the site is 100 percent adequate," said physicist Luis Pinguelli, when he learned of the decision announced by Hervasio de Carvalho.

Pinguelli also criticized the temporary nature of the solution found. "What I want to know is how is it going to be when all of the reactors are operating, because in that case there certainly will be no possibility of storing all of the waste at the same site. The decision is a demonstration of half-measures since once again there is not a definite solution to the problem."

The physicist explained that the material that will be stored at the site near Angra-I is the so-called low- and medium-radioactive waste comprised of all the objects that may have come into contact with radioactivity. These wastes must be solidified, treated and packed in drums.

Several rules must be taken into account in choosing a site for the storage of the waste: the site must be away from surface phreatic waters, there must not be any danger of floods or erosion, care must be taken that the subterranean waters that pass close by do not reach waters used by humans, animals or for the irrigation of crops.

8711
CSO: 5100/2154

INTERRELATIONSHIP OF FALKLANDS CRISIS, NUCLEAR ISSUE EXAMINED

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 23 Apr 82 p 8

[Commentary by Rubens Rodrigues dos Santos: "The Crisis and the Nuclear Issue"]

[Text] The report that "Argentina is already in a position to build atomic weapons," revealed by Vice Admiral Carlos Castro Madero, chairman of that country's National Atomic Energy Commission, compels us to make some comments on the delicate issue of the balance of military forces in South America, taking into account at the same time the surprising action undertaken by the Argentine Armed Forces in occupying an archipelago that had been under British control for 149 years. It is necessary to be very frank when the pieces are moved on the checkerboard on which South American geopolitics, which very closely interests Brazil, is defined.

If, on the one hand, it is essential to stress the good relations that today draw us close to Argentina--which all Brazilians certainly wish will become closer and closer, on the other hand, it is necessary to take into account the pragmatic consideration that the two countries, separated by the buffer state that is Uruguay, are the largest, most populous and economically strongest in the South American continent, with a long common border and with commercial interests and sociopolitical structures that perhaps may not always coincide in the future.

The first lesson to draw from the bold act of the Argentine military is that their impulsiveness becomes evident once again. It has been demonstrated today in a conclusive manner that they are capable of transgressing any code and all resolutions of international organs--devitalized and therefore insignificant--such as the United Nations and the Organization of American States, when the hegemonic tendency impels them or nationalistic interest urges them.

It is opportune to point out that that can happen--as in the case of the Malvinas--through the action of a catalyst prepared by minorities initially not representative of the Argentina nation, with the object of strengthening themselves internally at the expense of the intensification of nationalism, aroused by an external antagonism. There is not the slightest doubt--history is full of similar incidents--that the invasion of the Malvinas and the

Beagle Channel dispute can represent to the holders of power in the Casa Rosada, if not permanence in the government, at least the temporary interruption of an internal crisis that was on the verge of becoming uncontrollable.

There are those who say, furthermore, that there is a very secret agreement between Buenos Aires and Santiago to keep the Beagle Channel dispute alive as a means of arousing nationalist feelings in both countries.

Who will guarantee us that an impulsive minority of the Argentine military class--whose character and vocation became closely intertwined in the past in the courses given in Germany and Italy before World War II--will not one day carry out actions similar to the ones it is undertaking today against Chile and Britain in order to resolve economic or territorial disputes with its neighbors, or simply to balance possible deficiencies in the area of domestic policy stemming from the fact that the subject nation is not the largest, the most populous, or the one with the greatest potential in the South American continent?

On the other hand, consider the special character of the great majority of the Brazilian military. Our history is there to demonstrate the prudent nature and the tendency toward understanding on the part of our officers, who in the external area have never indulged in extravagant impulses, as slight as they might be. There is firmness and cohesion, of course, in dealing with foreign policy questions, but one cannot deny the almost mystic option of the Brazilian military for neutrality [equidistancia] and moderation in regard to everything that is discussed and disputed beyond our borders. Everything leads one to believe that this is all the result of geographic and sociopolitical factors that characterize us: the territorial vastness and the lack of permanent external antagonism, a situation achieved in the last century by the masterful action of the Baron of Rio Branco; the fact that the majority of the Brazilian military come from middle class families, many of them from distressed regions such as the Northeast; the quest for military unity but never the formation of a caste in Brazilian society.

All of those factors should be evaluated as we face the problem raised by the impulsive action of the Argentine military in the Malvinas, without losing sight at any time of the fact that this is an extremely delicate matter; in analyzing it, we obliged to involve in an apparently unfriendly manner a friendly nation, which must remain so at any cost.

A cost which, in the opinion of some analysts, must include as a basic element the maintenance of military balance in the South American continent, including in the area of nuclear weapons.

A Political Decision

We, thus, come to the complex problem of the development, possession and use of nuclear weapons in Brazil and Argentina.

There are those who oppose any initiative that may lead to the construction of a nuclear device, on the basis of perfectly valid reasons under some ethical, moral, religious and even strategic aspects. In an ideal world, which all yearn for, one could not fail to offer all support to those well-intentioned citizens. However, to our misfortune, the world must still be assessed from a realistic point of view so that the requirements of national security will always be taken care of.

Obviously, we are concerned not so much with that national security conceived in terms of a possible armed conflict (more difficult to occur but not wholly impossible, as the current events demonstrate), but rather in terms of that undeniable surreptitious hegemony that begins to manifest itself in political diplomatic and economical financial areas whenever there is a sign of a glaring military imbalance between neighboring nations, especially between those that are potential competitors.

Different Courses

The governments that thus far have decided to enroll their respective countries in the so-called "Atomic Club"--the United States, the Soviet Union, Britain, France, China and India--had to take three types of decisions in the years preceding their first nuclear explosion:

1. Economic: It was necessary to conclude that they were going to invest huge sums required by that initiative to the detriment of needy sectors of national life. That question was discussed often when India, with serious food and infant mortality problems, exploded its atomic bomb.

2. Technology: A nation must have sufficient specific technology (theoretical and practical knowledge that will enable it to surmount all the phases of construction of an atomic bomb) before deciding if it is advisable to develop a military nuclear project and to culminate it with an explosion. If that specific technology exists to a high degree in the country--as is probably the case in Japan (35 reactors), the Federal Republic of Germany (28), Canada (24), Spain (18), Sweden (12) and Czechoslovakia (11)--it is easier and less expensive to arrive at the atomic bomb. If that technology is not available, possession of that "instrument of persuasion and deterrence" requires that the government, before anything else, decide whether it is advisable to undertake an easier program for the acquisition of nuclear know-how, with more autonomy and at a lower initial cost, using natural uranium and therefore without the need to face the costly enrichment process (that was Argentina's option); or whether it is advisable to take a more difficult course that may require (as in the case of Brazil) an association with countries that already possess the specific technology and are prepared to grant it through compensation of an economic-financial and political-strategic nature, in order to implement a real, rapid and expensive transplant of a whole industrial line and its respective processes, although with less incorporation of technology in the short and medium terms. In this case, the initial cost is higher but there is the possibility of a quick amortization of the investment through the marketing of the electric energy produced.

3. Political: Necessarily, all of the preceding decisions are also political, but that peculiarity becomes more obvious when the country has the full specific technology, lacking only the essentially political decision to use it; that is, to place the plutonium of an appropriate degree of purity in the electromagnetic detonating device; something like putting the powder together with the cap in a revolver bullet.

Change of Course

Angra-I was a first step taken by Brazil to absorb nuclear technology based on a decision taken at the time of the Castello Branco administration, when Brazilian policy was defined in these words of the great Brazilian statesman:

"Historic and geographic realities have enrolled us in the security arrangement of the Western Hemisphere. It provides us with an effective nuclear shield against inclinations of extracontinental aggression, today not very likely in view of the so-called 'balance of terror.' We surely would not have the economic and even technical resources to create our own 'nuclear deterrent,' and if we sought to do so, we would do it at the expense of our economic development and standard of living."

Those prophetic words full of common sense were voiced by President Castello Branco at the War College (ESG) in March 1967.

Brazil was then guided by the "umbrella policy," according to which we should participate in bilateral agreements with the United States so as to have the protection of that power in case international or continental clashes occurred that overtly or covertly involved the military use of atomic energy. At the same time, the country would develop its own nuclear technology in a patient and slower manner, beginning with the "turnkey" (the suppliers turn over the key to the plant when it is ready) that ended up being called Angra-I. Using enriched uranium, we would pursue the moderate option that we mentioned when we referred to the political decision of whether or not to build a nuclear device; we would spend less money, would assure amortization of the investment but would take longer to absorb that so much desired atomic technology.

Everything leads one to believe that that policy, based on the thinking of former President Castello Branco, was opposed by influential sectors of our armed forces--with whom, everything indicates, President Costa e Silva was identified--all of them advocating a line of action independent of the United States in such a manner as to permit Brazil to master nuclear technology as rapidly as possible and thus to be in a position to assemble an atomic bomb, a condition for military balance in South America.

Perhaps the so-much talked about reservation that President Castello Branco made regarding the selection of General Costa e Silva to succeed him as chief of state was due in good part to that difference of views with regard to the Brazilian nuclear program. Only a matter of such strategic importance could have moved a large majority of officers--as occurred--and led them to contradict the prestigious and powerful military man of so many virtues, who was General Castello Branco, exercising the office of president of the republic and, by virtue of that, the supreme commander of the armed forces. Who knows if the nuclear issue did not really decide the presidential succession in 1967.

The fact is that two significant and highly worrisome facts for the Brazilian military were already becoming evident at that time:

1. The acquisition of nuclear technology by Argentina was occurring at a much faster rate than had been anticipated, which meant that the military of that nation would be in a position in the medium term to take a political decision to put an appropriate amount of chemically pure plutonium in an electromechanical device capable of causing a chain reaction.

2. The United States did not appear to be willing to grant us anything beyond the "turnkey" of the Angra-I type, with an unsatisfactory transfer of technology if Brazil continued to resist the pressures to sign the Treaty on Nonproliferation of Nuclear Weapons.

The threat of an imbalance of forces in the South American continent was thus shaping up; this resulted in strengthening the sectors of the armed forces that advocated a nuclear policy different from that supported by President Castello Branco, who had then already passed the office of chief of state to General Costa e Silva.

It is obvious that such an important change of course could not have been made without the military having faced one of the most crucial dilemmas that has arisen in our history: run the risk of being surprised at any moment in a clearly disadvantageous position, or divert large resources to the nuclear sector, with "the sacrifice of our economic development and standard of living," as President Castello Branco had predicted.

To our misfortune, that illustrious Brazilian was to die immediately afterwards in a plane crash, a fact that further weakened the group of administrators and military men who supported the "umbrella policy."

Brazil-Germany

The construction of the Angra-I reactor by Westinghouse under the form of a U.S. "turnkey" using enriched uranium and light water had already been decided by the time of the Costa e Silva administration, but it was known that Argentina was developing a vigorous and objective program using natural uranium and heavy water, having as its principal unit the Atucha plant.

It is necessary not to forget at any time that neither Brazil nor Argentina signed the Treaty on Nonproliferation of Nuclear Weapons, a fact that shows at least a quite significant reservation of intent.

Finally, on 27 June 1975, the Brazil-Germany Agreement was signed. We would receive all of the technology pertaining to the complete uranium cycle, including eight plants with a total power of 10,400 megawatts, support for the prospecting of uranium, technology for enriching it and for the construction of equipment intended for the progressive nationalization [share or participation by national industry] of the nuclear plants.

Strangely, however, that agreement did not include--at least overtly--the phase called conversion, which makes it possible to convert the uranium ore into uranium hexafluoride (UF6), which is utilized in the enrichment process. Perhaps in that way, it has been assured that that special segment not inserted in the agreement signed between Brazil and Germany (possibly something like the railroad switch point that permits sidetracking on a railroad trunkline) may remain outside of the safeguard which in fact weighs over the German-Brazilian agreement.

The Brazil-German Agreement, at an estimated cost of more than $30 billion, ended up becoming the disaster that is apparent, with so many political and financial impediments, so many surprises and questions that even the ultimate objective that probably inspired it can only be achieved by unexpectedly long and tortuous parallel roads.

Therefore, two questions are appropro the replies to which, we suppose, will never be given explicitly:

1. Would such a high price, by virtue of a secret parallel agreement, include the preparation somewhere of the plutonium and the electromechanical device that could eventually make feasible a political decision to provide the country with a nuclear weapon in a few hours?

2. In addition to receiving a large sum which ended up assuring the survival of a nuclear industry that was sliding into idleness, could Germany be availing itself of the possibility of continuing to develop a nuclear technology far from the policing that the World War II victorious allies still exercise in such a way as to have today (or to have in the very near future) a German-Brazilian nuclear device available for immediate use?

To Build or Not To Build?

To build or not to build eight nuclear plants; to enrich uranium using the controversial "jet-nozzle" process, of as yet unproven efficiency and economy; to locate the reactors in this or that region; to insure almost of the technology of the uranium cycle: could not all of that be the outer wrapping that we know, discuss and seek to judge vehemently, but the greater aim of which is to protect the secret content of real importance--the nuclear weapon without which the balance of forces would end up being seriously compromised in the South American continent?

After all, it has already been said that even a smart student of nuclear physics could assemble an atomic bomb in the basement of his home. It is obviously an exaggeration but there is not the slightest doubt that today a large number of countries can have available their own nuclear device, by buying or stealing technolgoy, obtaining plutonium from their own reactors or buying it at high prices in a very special underground market, establishing secret agreements on exchange and cooperation based on big financial strokes and complex strategic moves.

8711
CSO: 5100/2154

BRAZIL, FRG JOINTLY TO OFFER COOPERATION TO THIRD WORLD

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 24 Apr 82 p 27

[Report by correspondent Assis Mendonca]

[Text] Bonn--Brazil and West Germany are jointly going to offer technological cooperation to Third World countries in the area of energy production. That is one of the principal results of the talks held in Munich yesterday between Mines and Energy Minister Cesar Cals and the German minister for research and technology, Andreas von Buelow. That plan falls within the framework of the UN program to make Brazil the principal agent for the transfer of energy technology to the underdeveloped and developing countries.

The two ministers also agreed to a visit to Germany by two Brazilian technical missions that are going to study the expansion of bilateral cooperation in the energy sector. The first mission will be concerned with the area of utilization of nonrenewable sources, with special interest on the part of the Germans in intensifying cooperation in the coal mining and processing sector. In addition, the German Government expressed interest in participating in the shale exploitation project in Maranhao. The task of the second mission will be the utilization of renewable sources, especially wind and solar energy and hydrogen.

The sector dealing with the utilization of renewable sources is of special importance since it constitutes the nucleus of the program for the transfer of energy technology.

Nuclear Agreement

Cesar Cals declared that in all of his contacts in Germany thus far, the nuclear agreement has been the subject of conversation, although normally specific points were not dealt with. In the visit made yesterday by the mines and energy minister to the headquarters of Siemens in Munich, one of the points of the agreement was especially dealth with, namely, uranium enrichment technology. Siemens is the executor of the centrifugal jet process and they explained the operation of the technology in detail to the minister.

"Siemens guaranteed us that the technology has been mastered," said Cals.

The German is going to install a factory in Curitiba for the production of components for the isotopic separation plant.

The day before yesterday, the mines and energy minister also visited the Grafenrheinfeld nuclear plant, which is the reference model for the Angra-2 and Angra-3 reactors and for the two at Iguape. The Grafenrheinfeld plant is currently operating at 100 percent load and left a positive impression on Minister Cals: "The project is good. It appeared to me to be very advanced compared to other nuclear plants I have already seen."

Today, Cesar Cals will visit the Plasma Physics Center of the Max Planck Institute in Munich. On Monday, his schedule includes a visit to a coal gasification plant in Bottrop and contacts with German businessmen in the coal sector, in Bonn. On the last day of the official visit, on Tuesday, Cals will meet with Economics Minister Otto Lambsdorff, with whom he will have lunch. In the afternoon, the mines and energy minister will attend the signing of a contract between the Aerospace Technical Center (CTA) and the German DFVLR Agency. Later, he will be received by the president of the republic, Karl Carstens.

8711
CSO: 5100/2154

BRIEFS

FIRST YELLOW CAKE PLANT--Pocos, de Caldas, Brazil, 6 May (AFP)--President Joao Figueiredo today dedicated Brazil's first industrial plant for the production of uranium concentrate (yellow cake). This plant has a production growth of 500 tons per year. The basic project was drawn by the French company Societe du Cycle de l'Uranium Pechiney Ugine Khulman, and the plant cosntruction cost $240 million. The uranium concentrate (yellow cake) produced in Pocos de Caldas will be enriched by URENCO [a British-Netherland-FRG uranium enrichment consortium], and they it will be utilized in the nuclear plants which are being built in Brazil under provisions of the agreement signed with the FRG on 27 June 1975. [Text] [PY081008 Paris AFP in Spanish 0025 GMT 7 May 82]

CSO: 5100/2171

BRIEFS

ARGENTINE BOMB ABILITY VIEWED--Lima, 6 May (AFP)--Argentina can make its own nuclear bomb and has every right to do so to guarantee its survival, Gen Juan Barreda, chairman of the Peruvian Nuclear Energy Institute, has stated here. On announcing an international bid for exploration for uranium deposits in Peru, General Barreda said: There is nothing unusual in that Argentina can have its nuclear bomb, just like the United States can. He said Argentina has four uranium deposits which are now being exploited and thus it has the raw material needed to make the nuclear bomb. In conclusion he said that the Malvinas conflict had not affected the Peruvian-Argentine agreements on nuclear cooperation in peaceful research, and that a few days ago he had received the appropriate amount of money. [Text] [PY081027 Paris AFP in Spanish 1651 GMT 6 May 82]

CSO: 5100/2170

'BREAKTHROUGH' MADE IN NUCLEAR REACTOR TALKS

TA090751 Jerusalem THE JERUSALEM POST in English 9 May 82 p 1

[Report by Charles Hoffman]

[Text] A "breakthrough" has been achieved in attempts to initiate discussions with several countries on buying a nuclear reactor to generate electricity, according to Energy Minister Yitzhaq Berman.

Berman told THE JERUSALEM POST that after several years of efforts to get discussions started, several countries are now willing to search for a formula that may permit Israel to acquire a reactor.

He would not identify the countries with which Israel has been in contact, but said in response to previous reports that the most progress has not necessarily been made with France. The countries usually mentioned as potential sources of reactors are the United States, Canada, Belgium, France and Britain. Berman recently made several trips to Britain, where he discussed matters of coal, oil and nuclear power.

Berman said that in the past the main obstacle to acquiring a reactor was the unwillingness of foreign governments even to consider the idea until Israel had signed the nuclear non-proliferation treaty. The companies that manufacture the reactors, however, have always been eager to sell, he said.

Israel does not want inspection at its Dimona and Nahal Soreq nuclear reactors.

He said there has now been progress in negotiations between the companies and their governments aimed at finding a formula by which sales could be made to Israel without the latter signing the treaty. Western governments have come under increasing pressure lately from unions to do whatever they can to relieve growing unemployment.

The Westinghouse Corporation planned to sell Israel two reactors in 1977, but the deal was cancelled as part of the Carter administration's restrictions on the export of nuclear technology. Since President Ronald Reagan took office, observers have predicted that he would ease the curbs as they applied to Israel.

CSO: 5100/4721

BRIEFS

RSA NUCLEAR DEVELOPMENT--The Federal Government says it is in support of the efforts of the International Atomic Energy Agency, IAEA, to promote safety in nuclear energy development. President Shehu Shagari gave the assurance when the director general of the agency, (Dr Hans Blecht), paid him a courtesy call at the State House in Lagos. The president deplored the role of some Western countries in aiding the development of nuclear energy by the racist regime in South Africa, adding that the situation now poses a threat to Africa. President Shagari said that Nigeria was not in a hurry to sign the nuclear energy. He stressed that Nigeria could not sign the agreement now because nothing had been developed. Earlier (Dr Blecht) commended Nigeria for promoting disarmament and for signing the Non-proliferation Treaty. [Text] [AB181146 Lagos Domestic Service in English 0600 GMT 18 May 82]

CSO: 5100/2170

BRIEFS

NUCLEAR POWER STATION--The first South African nuclear power station, the Koeberg station near Cape Town, will begin generating power in the first half of next year. The South African minister of mineral and energy affairs, Mr F. W. de Klerk, says the delay in commissioning the station follows problems in acquiring nuclear fuel, but other sources have been found. He says it is to be expected that there would be minor delays in the commissioning of the first nuclear power station to be built on the African Continent. Mr de Klerk also says that South Africa is giving constant attention to the possibility of signing the Nuclear Nonproliferation Treaty. He says discussions regarding the matter are taking place but he is not prepared to provide more information. With regard to the synthetic production of fuel, Mr de Klerk says South Africa will have to decide soon on whether to build another plant on the lines of the existing oil from coal plants. [Text] [LD111152 Johannesburg International Service in English 0630 GMT 11 May 82]

KOEBERG OPERATIONAL IN 1983--The Koeberg nuclear power plant will be fully operational in the first half of the coming year, according to Minister of Mineral and Energy Affairs, F. W. de Klerk. During a discussion of his budget, de Klerk said that it should be remembered that Koeberg is South Africa's first nuclear power plant. Therefore delays and problems are to be expected. Still, the delays and problems that have surfaced so far are not considered unusual. The Electricity Supply Commission (ESCOM) has obtained fuel for the nuclear power plant from a different source than was originally planned. But delivery of the fuel was held up somewhat. That entailed some delays, but ESCOM is exerting itself to preclude any more delays. [Text] [Capetown DIE BURGER in Afrikaans 14 May 82 p 23]

CSO: 5100/5653

ALLOCATIONS, PROGRAMS, GOALS OF 1982 AEC BUDGET OUTLINED

Paris CEA NOTES D'INFORMATION in French Dec 81 pp 14-20

[Article: "The AEC Budget for 1982"]

[Text] The 1982 AEC [Atomic Energy Commission] budget will total Fr 13.4 billion. Its overall growth will be 18 percent in comparison to total 1981 allocations. This rate may seem satisfactory, but it nevertheless masks some highly contrasting situations: a difficult military budget, a generally better funded civilian budget, but also a very sharp imbalance between the programs of the Interministerial Research Package--increased subsidy of 24.1 percent--and the Technological Development Programs--increased subsidy of 14.6 percent.

A relative decline in "unscheduled" expenses (financial expenses, cost overrun of Superphenix, tax expenses, etc.) has made possible larger increases in resources for the programs alone, but certain sectors will not escape a certain shrinkage of their actual resources.

The main features of this budget are: On one hand, priority given to employment, with the creation of new positions in both the civilian and military sectors, reduction of the work week and the incorporation of a significant number of outside enterprises and personnel outside of labor agreements; on the other, a very vigorous investment policy, simultaneously aimed at launching major new operations (including TORE-SUPRA) and at modernizing the basic equipment of certain laboratories.

With regard to programs, the 1982 budget means the adaptation of research and development operations to government priorities: Particular emphasis will be placed on new areas of national technological development (biotechnology, electronics, robotics, food and agriculture, energy conservation, new energy sources) and on the coherence to be established among the whole public sector's operations.

In areas of research other than industrial innovation and valorization, in 1982 the AEC will give priority to basic research, particularly the controlled fusion sector, while maintaining priority for nuclear power, nuclear safety, reprocessing of irradiated fuels and radioactive waste storage and processing programs.

The 1982 budget appears to be a transition budget for the AEC. On one hand, the general guidelines of its nuclear power programs have been retained, with several major areas of interest: supply of uranium for France, development of new enrichment processes, nuclear safety, reprocessing of irradiated fuels, processing and storage of radioactive wastes. On the other hand, there is a clear development of intermediate-range guidelines, according to which the commission will be led to adopt new research goals in accordance with the priorities of public authorities: This is true in the case of robotics, biotechnology, electronics, food and agriculture, energy conservation, new energy sources, etc.

In budgetary terms, the simultaneous emphasis on basic research and these new developments will mean a very great increase in the establishment's investments, which will total more than Fr 2 billion, for the combined civilian and military sectors. Of course, such a situation reflects choices which are often difficult and the stringency of certain decisions is much more perceptible in the areas of nuclear energy applications and military applications.

Thus before going on to a more complete analysis of jobs and resources, the most difficult situations and most significant investments must first be noted.

Both have their place in a budget which is also characterized by a new dimension of social problems.

Social Aspect

The social aspect of the budget concerns five major areas.

First, by participating in the national research effort in both the basic research sector and the new technological areas of interest, the AEC will increase its staff by creating 100 new research positions. A supply of skilled labor will also be granted to the Military Applications Division [DAM], which will create 120 new jobs in 1980 [as published], warranted in particular by the production program for the M4 system.

Second, to comply with the national goal of combating unemployment, as of 1 January 1982 the AEC will reduce the work week to 39 hours for personnel on normal schedules and to 38 hours for teams subject to continuous service. Although the impact of this measure is difficult to measure a priori, in terms of jobs, in this connection the 1982 budget provides for the creation of 100 additional jobs.

Third, the AEC intends to combat the rapid and natural trend toward retirement, resulting today from the massive recruitments of the 1960's. The solution under consideration is the early replacement of personnel reaching the age limit, a significant increase in their number being expected after 1985. Although the creation of about 100 new jobs for 1982 is intended, in particular, to make it possible to handle and complete certain prior hiring and reclassification operations, this method should also involve 200 additional recruitments for 1983, 1984 and 1985 each, as the AEC has already proposed in connection with preparing the research guidelines and programming bill.

Fourth, the decision has been made to negotiate with trade unions the matter of hiring personnel outside of labor agreements. Based on a conflicting assessment of situations in which outside labor was closely mixed in with the establishment's personnel--but without being subject to the same regulations--as a proposed frame of reference, the 1982 budget has scheduled the hiring of 3,000 persons, staggered throughout the year.

Fifth and finally, in 1982 the commission will exercise solidarity within the group to come to the aid of affiliates which would be facing problems of converting their labor. The main reclassification operation will concern the SFEC (Catalytic Components Production Company), which is experiencing a sudden decline in operations, related to completion of the Tricastin enrichment plant. For this company's employees, the AEC will reserve a percentage of positions in scientific plants of the civilian and military sectors.

The scope of the new employment policy, which constitutes one of the principal features of the 1982 budget, can thus be evaluated. To complete this quick survey, it should be added that some of the commission's operational plants will be making a considerable effort to convert and reclassify their employees in order to cope with the development of their programs. In this regard, we will mention in particular the effect of program decisions with regard to isotope separation, which will be carried out at the expense of gaseous diffusion and to the benefit of advanced uranium enrichment processes (lasers, cyclotron resonance) and the chemical exchange process.

Budgetary Limitations

The mention of such problems naturally leads to mentioning the main budgetary limitations for 1982. Such difficulties will be related either to the dynamics of certain programs and the inadequacy of allocated funds to implement them or quite simply to strained situations, necessarily leading to certain operational reductions.

The first case includes the industrial innovation and valorization sector, which, quite paradoxically, is enjoying an apparently spectacular growth rate (+39 percent) for its resources and will experience unprecedented problems in 1982, since it must simultaneously provide for the development of radioelements and the paranuclear sector, initiate the rapid development of new areas of interest such as robotics, the food industry and biotechnologies, and support LETI's [Data Processing Technology and Electronics Laboratory] new microelectronics program to a significant degree. If it wants to safeguard the coherence of its programs in this area, the AEC will undoubtedly be obliged to financially dissociate itself from the EFCIS [Study and Manufacture of Special Integrated Circuits], now totally included in the new public sector.

Another example, already mentioned, is that of isotope separation: one of the commission's major planned investments, the industrial pilot plant for demonstrating chemical processes, whose importance is vital for the future, will probably not be able to be financed beyond engineering studies this year.

In the second case, that of sectors which will not be able to be developed in 1982, we will mention the programs concerned with electric-power reactors on one hand and on the other, the programs for the design, production and testing of nuclear weapons.

With regard to reactors, a reduction of actual subsidy resources is obliging the AEC to make choices at the expense of studies on fast-neutron reactors in order to maintain a reasonable level of research, development and aid to operators of the PWR [pressurized-water reactor] system. AEC action will concentrate on supporting the construction of Superphenix in the case of breeder reactors, with studies on continuing the system being considerably reduced.

The military sector's growth rate is limited to 16.8 percent, which is the lowest figure recorded in several years. Thus the establishment of essential new resources, in the case of both nuclear testing and the production of weapons on order, is obliging the DAM to reschedule the accomplishment of other goals.

Financial difficulties are also currently affecting the enriched-uranium production sector. Due to the divergent development of uranium and electricity prices, these difficulties exacted a heavy toll on COGEMA [General Nuclear Materials Company] in 1981. They could become worse in 1982 and following years in the absence of any revision of current financial conditions.

A Budget Resolutely Oriented Toward the Future

Although it does not eliminate some important areas of concern, the 1982 budget will nevertheless be resolutely oriented toward the future as a result of investment. For the voluntarism of 1982's budget choices also reflects this very clearly. To characterize this effort, we will point out four major equipment programs, while mentioning the scope of the contribution which they represent for the economies of the regions where they will be implemented.

The first of these is TORE-SUPRA, Tokomak Superconductor of Cadarache.* In launching its construction, the AEC has agreed to a 5-year investment of Fr 555 million (under economic conditions of 1 January 1981), which will benefit the Provence-Cote d'Azur region, since its installation will be followed in 1986 by that of a laboratory with more than 350 physicists, engineers and technicians and an annual operating budget of approximately Fr 200 million, whose regional scientific influence will be particularly substantial.

Second, there is LETI's investment program in the area of microelectronics, which now represents one of the most promising areas of the commission's paranuclear operations. This program, which is intended to provide the resources essential for implementing a new "Post-VLSI" microelectronics plan (1981-1986),** could account for up to an annual expenditures level of approximately Fr 100 million in 1982 and in each year from 1983 to 1986. Beyond financial difficulties, which are currently not resolved, resulting from the scope of this plan, its continuation will greatly affect the future of the Grenoble Nuclear Studies Center.

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*In the area of controlled fusion, the TORE-SUPRA program is aimed, on one hand, at acquiring significant experience in using superconductor technology and, on the other, at studying current problems of confining and heating plasmas.

**This plan is part of the extension of LETI's studies, in connection with the Integrated Circuits Plan, on MOS technologies and high integration levels (VLSI).

The third investment to begin in 1982 is the pilot plant for uranium isotope separation by chemical means. As we have seen, the project's budget allocations have not reached the level required by the AEC's bills-payable book, of course, but the initial stimulus has been provided for a project whose total package is Fr 500 million, in 1982 value. This is an extremely important decision both technologically and politically: giving international commercial credibility to the nonproliferant Chemex process developed by the AEC by demonstrating its industrial and economic feasibility with a pilot installation. Even more is at stake, since this technology has proved well suited to the future needs of developing countries which would choose nuclear energy, for it should be particularly competitive in the case of low-capacity installations.

The choice of Pierrelatte for the installation of the pilot plant is also of the utmost importance for the future of this site and the region, since in the intermediate term it can help to solve the very acute reconversion problems currently being experienced by this area, whose human potential must be protected.

Finally, among the most significant trends of 1982, we will mention the highly sustained investment activity in the case of reprocessing, with continuation of the pilot installation for reprocessing fuels of the rapid TOR system, whose construction was started in 1979 and which will go into operation in 1984. The TOR investment will total Fr 120 million in 1982, including experimental units.

This investment concerns the Marcoule Center, whose mission, with regard to reprocessing, will be even better assured for the future with the start, in 1982, of the so-called Atalante operation for the transfer and modernization of the installations for plutonium studies, currently located at Fontenay-aux-Roses. This decentralization is also a very broad program, since it will extend over the entire decade and all planned allocations between now and 1985, in the basic documents which will be used to prepare the research appropriations act, represent approximately Fr 260 million in 1981 francs (HT [excluding taxes]).

Initially, it was important to note the most salient features of the 1982 budget choices, whether they were the most dynamic or the most worrisome.

Now we will analytically detail the major parts of this budget, in terms of resources on one hand and in terms of jobs on the other, while describing the content of the main program policies.

Financing

The commission's budgetary resources will total Fr 13.429 million in 1982, which represents an 18-percent increase over the 1981 budget. In view of the current 13.2-percent hypothetical average fluctuation of prices, considered by the government in the 1982 economic budget, in constant monetary terms this budget's growth is therefore 4.2 percent.

In making an analysis, however, it is important to distinguish between the civilian budget and the military budget, which respectively represent 51 and 49 percent of the total financing. In 1982, the civilian budget's growth will be greater, since with an overall increase of 19.2 percent, it will surpass that of the military budget (+16.8 percent) by 2.5 percent.

The difference in rates appears smaller, however, if we restrict ourselves to the expected increase in subsidies, from the Ministry of Research and from the Ministry of Defense: 17.8 as opposed to 16.8 percent.

This itself shows the relative size of the AEC's own resources within the civilian budget, of which they will represent 23 percent in 1982. The growth rate of these direct proceeds will be 23.6 percent, which assures civilian resources of substantial additional support and at the same time provides many units with useful management flexibility.

Each of these three resource categories should be described.

1. The civilian subsidy has been fixed at Fr 5.2618 billion, which are divided into two subdivisions of unequal size in the government budget: the portion allocated for the Interministerial Research Package (EIR): Fr 1.8662 billion, up 24.1 percent; the portion allocated to Technological Development Programs (PDT): Fr 3.3956 billion, an increase of not more than 14.6 percent.

This distinction shows the sharp funding gap between basic research programs and industrial innovation and valorization, on one hand, which benefit directly from the boost provided by public authorities for the research budget and, on the other, the missions directly related to the nuclear power program, on which the effect of the new research policy is less perceptible.

The contrast is somewhat less pronounced, however, inasmuch as the amount of unscheduled expenses, much more of a burden for the PDT than the EIR, is reduced substantially in 1982, particularly as a result of curbing the "Superphenix cost overrun."

Thus in the final analysis, we should compare the development of the subsidies granted by the Ministry of Research and Technology to each program group, while considering unscheduled expenses separately:

1981	1982	Variation	
Subsidy for EIR Programs	1.2488	1.6272	+26.7%
Subsidy for PDT Programs	2.1426	2.5338	+18.3%
Unscheduled Subsidy	1.0388	1.1008	+ 6.0%
Total Civilian Subsidy	4.4663	5.2618	+17.8%

(AP [Program Authorizations] + DO [expansion unknown] in billions of francs)

2. Funds transferred from the defense budget will total Fr 6.538 billion in 1982, or an increase of 16.8 percent.

At this point we will compare the allocations of sections of the joint portion of the defense budget, which have risen from Fr 5.433 billion to 6.302 billion overall and have consequently increased 16 percent, and those of section 53-71 of the "Navy" portion, whose absolute value is much smaller (Fr 236 million in 1982) but which have risen 43.6 percent.

The former provide for the financing of weapons studies and production, including the production of their required nuclear materials and technological nuclear-propulsion studies. The latter cover the production expenses of nuclear boilers ordered by the National Navy: missile-launching nuclear submarines, attack submarines and surface vessels.

3. Finally, with regard to direct proceeds, whose overall growth will be greatest (+23.6 percent), as we have seen, they will total Fr 1.6291 billion in 1982, with 97 percent (Fr 1.5803 billion) for civilian operations and 3 percent for military operations.

An analysis of this category shows that, apart from the expected proceeds, in 1982, of patent rights fees (Fr 125 million) and other proceeds (Fr 64 million), the Fr 1.580 billion in civilian direct proceeds are divided into three categories of equivalent size.

First, we will mention revenues actually related to turnover. They represent Fr 478 million and correspond to energy production and sales (Fr 241 million) and sales of stable isotopes and radioelements (Fr 237 million). Their overall growth is approximately 20 percent.

Second, we should note the financial counterparts of services rendered (Fr 494 million), whose largest item (Fr 121 million) is that of fees paid by operators of nuclear installations, partly returned by the Ministry of Industry to the AEC as expenditures for analysis and supervision which the commission carries out for public authorities.

Otherwise, the "services rendered," which are generally not billed for more than their cost price, are comprised of industrial hygiene benefits and safety and protection assistance provided by the AEC's Department of Protection, EDF [French Electric Power Company] coverage for inspections of operating PWR reactors, which the AEC provides as a result of having developed in-service inspection machines (MIS) and pipe-inspection machinery (MIT), making labor available to outside agencies, and general or technical support fees billed to companies with installations at nuclear studies centers.

"Counterparts of services rendered" will increase nearly 26 percent from 1981 to 1982, due mainly to the planned increase in fees from safety analyses, made possible by the 40-percent increase in the schedule of fees, in accordance with the financial appropriations bill for 1982.

Third and last, Fr 419 million in direct proceeds will be provided in 1982 by the contributions of outside agencies to joint scientific programs; such contributions are most often provided through a 50/50 partnership framework. In the case of the most significant items, for example, there are the EDF's contributions to reactor safety programs or for operation of the Cadarache advanced-prototype boiler, where the AEC conducts endurance tests on fuel assemblies, and the participation of public authorities in the "Nodules" project (Ministry of Industry), the electronics programs of the AEC (DIELI [Department of Data Processing and Electronics Industries of the Ministry of Industry]), DAII [Department of Industrial and International Affairs], CNET [National Center for Telecommunications Studies of the Ministry of Posts and Telecommunications], DGRST [General Delegation for Scientific and Technical Research], DRET [Directorate of Technical Studies and Research of the General Delegation for Weapons], as well as the participation of the IN2P3 [National Nuclear Physics and Particle Physics Institute], (CNRS [National Center for Scientific Research]), in operating the "Saturne" particles accelerator.

But particularly in 1982, there will also be Euratom's contribution to the French controlled-fusion program and to the construction of TORE-SUPRA, whose operation was made possible through preferential financial support (45 percent of machinery costs) from the European Economic Communities.

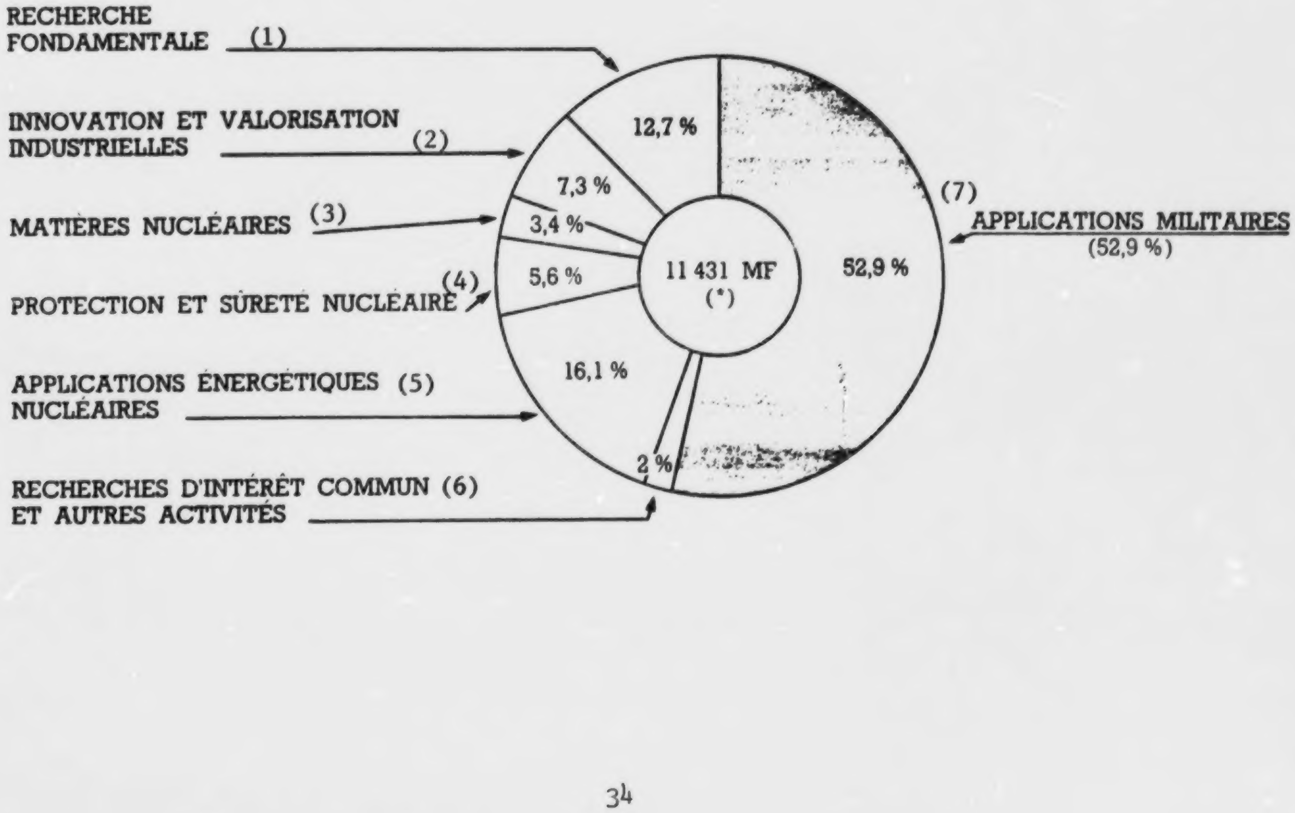
Due to this latter financing in particular, all "outside contributions" have increased nearly 45 percent overall.

On the whole, we note the strong dynamics of "direct proceeds" among total resources while underscoring the relationship which exists between the subsidy level of the establishment and this "revenue effect." The overall growth of operations caused by the effort provided by the state budget puts into play a multiplier phenomenon in the case of the establishment's own revenues.

The Programs

With regard to jobs in the 1982 budget, we will analyze the commission's scientific operations on the basis of its current division into six major civilian missions and one military mission, whose respective sizes are illustrated by the following diagram:

1982 AEC Programs



(*) The gap between this figure and the total of the 1982 budget (Fr 13.429 billion) corresponds to the amount of unscheduled expenses such as financial expenses, tax fees, early retirements, nuclear safety expenditures, Superphenix cost overrun. It also explains the 52.9 percent of military applications in the programs, whereas this is only 49 percent in the budget.

Key:

1. Basic Research
2. Industrial Innovation and Valorization
3. Nuclear Materials
4. Nuclear Safety and Protection
5. Nuclear Energy Applications
6. Research of Common Interest and Other Activities
7. Military Applications

The EIR programs, which have generally been given budget priority in 1982, are those of the basic research (RF) mission and the industrial innovation and valorization (IVI) mission.

Such priority means an increase, of 27.2 percent overall, in specific financing for the two missions. The basic research budget is particularly oriented toward investment in 1982. The controlled-fusion sector is the most representative in this regard, with the launching of the TORE-SUPRA operation and initial funding of Fr 147 million. The AEC will also have to meet calls for funds to cover the French association's participation in the construction of JET (Joint European Torus), underway at Culham (Great Britain).

Paralleling this controlled-fusion effort, the budget of the Institute for Basic Research [IRF] will continue to finance a very extensive program for major scientific plants, including mainly:

Final construction of the National Large Heavy-Ions Accelerator (GANIL) at Caen, as well as the testing and adjustments required for its operation for the benefit of researchers in 1983;

The AEC contribution to the operation of the Laue-Langevin Institute (ILL), a part of which is to be used for "second-wind" financing of the high-flux reactor at Grenoble; this modernization operation will continue to 1985 and will enable the ILL to retain its world lead in neutron spectroscopy beyond 1990;

The installation, in progress at the Saturne National Laboratory, whose field of research is complementary to that of GANIL, of the third large very-high-angular-resolution spectrometer, which will open a vast field of research extending over a whole decade;

Modernization of the Van de Graaff Tandem accelerator, which, by means of superconductor cavities constructed with the participation of the DAM, will make it possible, on one hand, to prepare for training teams and developing equipment to be installed for GANIL and, on the other, to continue current research.

But in addition to this group of major investments, in 1982 the IRF will launch a program of studies focusing on solar biotechnology in cooperation with the CNRS and, with financial aid from the Solar Energy Commission, will begin construction of the corresponding laboratory at Cadarache. The program will have a dual focus, studying the direct bioconversion of solar energy by photosynthesis on one hand, and on the other, the conversion of biomass, with priority being given to the study of bioproductive systems for hydrogen and methane. While maintaining its level of activity in all other sectors of basic research, in 1982 the IRF will also start restandardizing the material and human resources of its laboratories, giving preference to developing so-called "light" research such as biology, theoretical physics, condensed-state physics, atomic physics, astrophysics and geophysics.

The 1982 AEC budget will have its greatest growth in the industrial innovation and valorization sector, with a 39-percent rate of increase.

If this mission maintains its triple goal in 1982 of supporting an applied research effort outside the nuclear sector, of transferring AEC technology and experience to French industry and direct valorization of know-how acquired by the commission's teams, its new programs and resources will make it possible to begin establishing areas of technological development in robotics, food and agriculture, and biotechnologies, whose importance is bound to increase substantially in coming years.

Priority for Nuclear Safety and Protection

The group of programs comprising the nuclear materials missions, nuclear safety and protection, nuclear energy applications and research of common interest and other operations has also been assured of an overall growth of 18.8 percent.

With regard to research of common interest, whose goal is to provide for the maintenance and modernization of installations of general interest at nuclear studies centers, we will limit ourselves to saying that such financing is scheduled to be increased by 19.3 percent to provide a level of safety, maintenance, radiological protection and processing of radioactive wastes and effluents in keeping with the general development of scientific operations peculiar to each establishment.

With regard to the other three missions, the 1982 budget appears quite varied.

The resources of the "nuclear materials" mission will be increased substantially (+26.1 percent), which does not reflect the difficult decisions which had to be made in this area and which were described above with regard to isotope separation. The small relative amount of the mission's funds and the multiplicity of its priorities (advanced procedures, chemical processes) explain this paradox.

However, and despite the problems encountered, on an industrial level the commission will give full priority to fulfilling its licensing obligations to EURODIF [European Diffusion Agency], whose full operation will take place, as scheduled, in late 1982. The AEC will thus be obliged to provide the means for solving the technical problems which generally accompany the initial operation of industrial complexes of this size; expertise and measurement operations will be conducted to learn as much as possible about the installations' operation.

The AEC will also actively continue its research concerning natural uranium to assure France of the renewal of its ore resources and to improve its supply security. The programs will therefore be focused on finding resources whose technical availability is gradually declining, on renewing or optimizing exploration techniques and on uranium recovery and extraction processes.

The "nuclear safety and protection" mission's budget will undergo an overall change of 18.5 percent, which, without increasing it substantially, confirms the priority which has been given to its programs for several years.

Two major functions are confirmed among AEC safety programs: technical support for government safety authorities and a very broad research and development program concerning the safety of the entire fuel cycle and nuclear reactors.

The first function, which has the nature of a public service mission, includes very specifically: analysis of the safety records of all French basic nuclear installations; technical monitoring, from the standpoint of safety, of these installations' operation; and quite recently, national control of nuclear materials, as established by the law of July 1980 and its implementing regulations of May 1981.

In 1982, all of these technical support operations for the Ministry of Industry will have their resources increased by 25 percent, with 100-percent coverage, for the first time, of expenses by direct proceeds from fees paid by operators of basic nuclear installations.

The second major function of research and development safety operations focuses on several programs of national interest: the protection of mankind and the environment, an area in which the AEC will continue in 1982 to implement a very broad program, includes the preparation of radioprotection standards on the international level, on one hand, and on the other expertise operations related to safety permits (effluent waste permits, formulation of special intervention plans in the event of accident); applied research and development regarding reactor safety.

In the case of water reactors, the AEC will simultaneously provide for the gradual establishment of operating conditions defined in the light of what has been learned from the accident which occurred in the American reactor at Harrisburg, since an analysis of malfunctions shows that they may be early signs of accidents, which itself would lead to corrective measures, and finally, for improved knowledge concerning the behavior of nuclear installations and their components in accident situations, making it possible to validate computer systems, and concerning the man-machine interface. With regard to fast-neutron reactors, current programs will be actively continued: studies of the long-term behavior of materials used for internal structures subject to high temperature, studies of the means of inspecting a reactor vessel in service and accident studies. In this latter case, putting the ESMERALDA installation at Cadarache into service constitutes a major goal for the study of large sodium fires.

Finally, we will point out the studies on the safety of fuel-cycle installations, an area in which the AEC should reach a particularly satisfactory level of knowledge in 1982 in critical studies; the control of sensitive materials, which will be subject to a sharp increase in the means employed; and finally, the efforts which will be made in the current priority sector of radioactive wastes, in which the AEC is striving to improve its knowledge of the long-term behavior of storage barriers, to define specific safety criteria and to evaluate the safety of permanent storage, either on the surface or in deep geological formations.

Finally, the 1982 budget provides for an overall growth rate of 18.3 percent for the "nuclear energy applications" mission, which alone represents nearly 35 percent of all civilian financing.

Among its programs, two main sectors can be distinguished: studies devoted to reactors, as well as to fuel production, and those concerned with other stages of the fuel cycle down the line.

The first sector has a budget of Fr 1.248 billion, up 18.1 percent. The second sector, which simultaneously is concerned with fuel transport and reprocessing and waste processing and conditioning at the end of the cycle, will have its resources raised to Fr 587 million, or an increase of 18.8 percent.

The major features of these budgets are as follows:

a) In the case of ordinary-water reactors: support for the EDF in developing computer systems, monitoring the activity of primary circuits, neutron physics experiments, development of methods for nondestructive monitoring of reactor vessels; maintenance of an extensive program for water-reactor fuels, in particular, in cooperation with FRAGEMA* to develop fuels whose performance will be superior to that of current fuels; continuation of important programs for the study of components, particularly steam generators, and for reducing the irradiation of personnel--a number of studies undertaken under the quadripartite program, whose present form will end in November 1982, have been continued in a strictly French context with EDF and FRAMATOME [Franco-American Atomic Construction Company]--whereas new programs for the design of a 4,250 MWth nuclear boiler will be launched with the national builder (N4 project).

b) With regard to reprocessing and wastes: support, through an extensive research and development effort, for construction in The Hague of plants which will gradually be put into service starting in 1986 and which will make it possible to have, by 1988, reprocessing capabilities for ordinary-water reactor fuels of 1,600 tons/year, to be used for both domestic needs and the satisfaction of foreign contracts; paralleling this, the continuation of preliminary studies for designing a prototype plant for reprocessing fast-neutron reactor fuels; a greater research and development effort for the processing, conditioning and storage of radioactive wastes.

c) With regard to fast-neutron reactors: technical support for Superphenix construction and establishment of data-gathering structures at the time of starting tests; determination, in cooperation with EDF and NOVATOME [expansion unknown], of characteristics of reactors which will succeed Superphenix.

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*FRAGEMA: A company established in 1981 jointly by FRAMATOME and COGEMA for the design and marketing of water-reactor fuels.

Finally, the commission will continue the preliminary studies related to the THERMOS [expansion unknown] project for demonstrating urban heating by means of a special nuclear reactor, with a view to its possible construction at the Saclay site.

Military Programs

Before concluding this examination of the 1982 budget, we will provide a quick survey of its military programs.

Allocations of the "military applications" mission in 1982 will be increased by 17.1 percent over 1981, which does not make it possible to prevent certain programs from extending into 1983 and future years.

Excluding the "diversification for the benefit of Defense" program, which corresponds to various studies (resistance to electromagnetic effects, vector resistance, sale of irradiation and various tests) conducted by the DAM and financed exclusively by direct proceeds, the military applications budget is comprised of three subdivisions:

Programs for the design, production and testing of weapons. As part of the "ordered weapons" programs, the effort will continue in the case of the M4 and ASMP (medium-range air-to-surface [missile]) weapon systems, which will become operational in 1985. The M4 system, acquired in late 1979, has required significant resources, particularly at the experimental level. The "future weapons" program has two goals: future strategic weapons and future tactical weapons, destined to replace current weapons during the next decade.

Allocations for the "improvement of basic knowledge" permit the commitment of a significant amount for the Phebus project at Limeil, which is a high-power laser for pursuing dense-plasma studies and improving the DAM's knowledge of physical phenomena occurring during the operation of weapons.

A specific "nuclear materials" budget, whose allocations have increased slightly under the terms of current agreements with the Ministry of Defense.

Finally, the nuclear propulsion programs and the naval program. The "naval program" will be greatly expanded, whereas the "nuclear propulsion studies" goal will grow only slightly. This is explained by the operation of the CAP (Advanced Prototype Boiler) at Cadarache, which will be entirely under the civilian sector's control in 1982, whereas it was only partially so in 1981. Other activities related to this goal correspond to PAT (Ground Prototype A) studies and maintenance, which will be greatly streamlined.

Concluding this survey of 1982 budgetary perspectives, we will note this budget's signs of encouragement for the future.

In beginning this survey of the 1982 budget, we said that it bears the mark of a transition.

The significance of the studies conducted by the commission and its scientific potential and achievement prove that, in a general context which is very favorable for all French research, the sense of this transition is to provide the establishment's programs and resources with new growth.

The increase in its funding within the Interministerial Research Package, the creation of new jobs which have been approved for the EIR and the launching of major new scientific installations must be interpreted as signs of such a development.

We believe that the voluntarism of the internal decisions, by which the establishment has itself striven to protect the future of its programs at the cost of sometimes painful choices, will be met by their necessary intermediate-term developments and on which the next research orientation and appropriations bill should confer official impact.

11915
CSO: 5100/2117

PROGRAM STRESSES BREEDER REACTOR, URANIUM ENRICHMENT PROCESS

Paris INDUSTRIES ET TECHNIQUES in French 10 Mar 82 p 79

[Report by Jacques Houbart on presentation given by Jules Horowitz and Georges Vendryes, both of the AEC, at colloquium on high technology, 17-18 March 1982]

[Excerpt] If high technology is defined less by sophistication than by the importance of its fallout and the fertilization of the industrial soils, the nuclear case is particularly exemplary. It is not the least among the good points in the report prepared by Jules Horowitz, director of the Basic Research Institute of the CEA [French Atomic Energy Commission], and George Vendryes, director of nuclear applications for CEA, that it forcefully recalls this truth, which has been concealed too long and too often. They did succeed in their intention to unveil the atom without disguise. Today, French industry holds a leading position in the decisive stages of the electric-nuclear cycle: uranium enrichment, perfection of a line of breeder reactors of the Superphenix type, and construction of the only operational unit--on the industrial level--for the reprocessing of irradiated fuels from power plants. It was possible to achieve this technological breakthrough as part of a major nuclear electric power program with whose help, starting in 1981, 1 kwh of every 3 kwh produced by EDF [French Electric Power Company] was of nuclear origin; the target for 1985, that is, 1 kwh of every 2 kwh, should be reached somewhat ahead of schedule. Various lobbies are working hard in a last-ditch attempt to obstruct the development of atoms for peaceful uses. They intend to block the development of breeder reactors and the reprocessing plant at La Hague; as emphasized by Jean Rastoin, chief of the Mechanical and Heat Studies Department of CEA: "This is an integrated process whose phases are coordinated. The reprocessing plant not only eliminates waste coming from power plants in operation but also provides fuel for the power plants that are equipped with breeders." According to Achille Farrari, the breeder line--of which France is the chief promoter, although the USSR and the United States are also working in this field--"makes it possible to use all of the uranium contained in the mineral, thus multiplying the quantity of energy that can be gotten out of one and the same quantity of uranium by 70-80. In these reactors, French uranium reserves become the energy equilvalent of the petroleum reserves of the Middle East!" The year 1984--the date of connection to the Superphenix at Creys-Malville--will thus be a key date, the date of a complete nuclear electric power cycle.

While the breeder reactor "represents the most important innovation now available," another national technology, developed by CEA, looks very promising. This is a "nonproliferating" uranium enrichment process that is particularly worthwhile for nations that would refuse isotope separation installations (such as ultracentrifugation, for example) that might more easily lead to the production of military raw material. This "chemical" way--which is much easier than gaseous diffusion--enables a non-nuclear power, by means of a slight additional cost, to guarantee its supply or to add to the lifetime of its uranium sales [as published; stockpiles] without risk of proliferation.

Toward the Fusion Reactor

Parallel to the electric nuclear power program, R & D activities--especially under the aegis of CEA--give the entire sector a major promotion role in the industry. Bio-industry and biomedical engineering will benefit in particular from that through instrumentation on the basis of radioactive elements, radiation chemistry and biomedical analysis techniques. On the basis of the competence it has acquired in electronic remote handling, in information science and in shape recognition, CEA represents a major center in the robot field.

Knowledge and capability acquired in the area of work in a hostile environment also open up prospects for the techniques used in nodule harvesting. Basic research in microelectronics prepared the way to the future micronic or submicronic product lines, the study of magnetic-bubble memories and the study of the Josephson effect. In agribusiness, we might mention work on solar greenhouses, on separation methods using ultrafiltration and extraction by means of solvent and the use of radiation for food conservation. French nuclear research continues its feasibility studies on a nuclear electric reactor involving the use of fusion. "The new Tore-Supra machine, using the 'Tokomak' technique with superconducting magnets, with its more concentrated structures and its more advanced technology, will yield a higher performance than the European 'Jet' installed at Culham (Great Britain)," Jean Rastoin emphasized. "Furthermore, we hope that the next European installation in the fusion field will be set up at Cadarache (CEA)."

5058
CSO: 5100/2147

STRIKES HALT CONSTRUCTION WORK AT GRAVELINES, CRUAS

Paris LE FIGARO in French 17 Mar 82 p 13

[Text] The construction site of sections 5 and 6 of the Gravelines nuclear reactor is still blocked after 3 weeks by the workers of Thermatome, a subcontractor, who are on strike to obtain full payment for the days lost because of an earlier conflict.

About 2 months ago, the 2,000 salaried employees of SGE (Societe generale d'entreprises) [General Business Corporation], working to finish the shell of the last two sections, went on strike to demand the cancellation of 700 layoffs which were to occur at the end of February. They succeeded in getting these layoffs canceled and received a bonus equal to the amount of the strike days.

The other companies had laid off their personnel. Because of this, the strikers received more money that those who had been laid off. The latter, in order also to obtain the entire payment for the lost days--and not unemployment benefits, an anount which is clearly less--in their turn blocked the construction site, and it was the workers of SGE who found themselves in enforced idleness.

Last Monday, a week ago, the strikers, who were only letting the employees of EDF [Electric Power Company of France] in charge of production go through, clashed with management and supervisors who refused to let themselves be monitored. Production at the reactor was halted for 48 hours; then the strikers relaxed the controls and the reactor was recoupled to the network.

On Friday, negotiations took place with CGT [General Confederation of Labor] delegates from the construction site, management and inspectors. But it was not possible to reach an agreement. Yesterday the strikers reorganized the pickets but agreed, for the first time since the beginning of the conflict, to let the subcontractors' employees in charge of maintenance of two sections halted for technical reasons go past. A new joint meeting must take place. Each side hopes that a solution will be found at that time.

The interprofessional employers' union of the Dunkerque region stated in a communique issued yesterday that "the strike is a responsible act, [but] to pay for it is to make of it an irresponsible act," and it asks "the government "in the most solemn manner that everything be set in motion so that a solution might be found to this conflict and so that, in this way, the companies and their workers might work without hindrance of any kind."

Far from the North, in the center of the country, another nuclear reactor under construction, at Cruas, is experiencing social conflict. On Tuesday morning, the workers of the Nord-France factory who are employed in the construction of the nuclear reactor at Cruas (Ardeche) blocked the entrance to the site where about 4,000 persons are working, it has been learned from a union source.

The 130 employees of Nord-France, which is building cooling towers, intend in this way to protest the almost certain layoffs of 107 of their number at the end of the job. According to the CGT, these workers had been hired on contracts of undetermined length.

After 13 Days of Strike

In contrast, the 1,600 workers employed on the nuclear reactor site at Cattenom (Moselle) voted 52 percent to return to work, following an agreement signed Monday night between the 10 company managers in charge of the construction work of sections 1 and 2 at the site and the delegates of the CGT, the only union represented, it has been learned from a union source.

The employees demanded that the reduction of their worktime be carried out by ending the workweek at noon on Friday, as well as by paying for a 13th month and adding a fifth week of paid vacation to the annual month of vacation.

After 13 days of strike, the agreement has given them partial satisfaction: the strikers have won their case for one Friday out of four, and the 13th month will be paid at 2,400 Fr as against the 3,000 Fr claimed. As the fifth week of paid vacation can be granted to them only between Christmas and the first of the year, according to legislation, the union members are going to demand the opening of negotiations with the Ministry of Energy and the EDF national leadership.

Moreover, the strikers who demanded a compensation of 50 percent of the strike days have obtained a compensation bonus of 500 Fr and an advance of 1,200 Fr to be repaid over 6 months.

9865
CSO: 5100/2133

PROBLEMS OF NUCLEAR WASTE STORAGE AT SAINT PRIEST

Paris LE MONDE in French 5 Mar 82 p 12

[Article by Marc Ambroise-Rendu: "The Question of Storage of Nuclear Waste Is To Be Taken Up Again in Its Entirety"]

[Text] "The plan for storing nuclear wastes in the town of Saint-Priest-la-Prugne (Loire), as it was presented in 1979, is unacceptable. The process of implementing it has been abandoned."

Those are the terms of the communique issued Wednesday 3 March by Edmond Herve, minister delegate to the Ministry of Industry for Energy, at the end of his 2-hour interview with a delegation of elected officials, scientists, and representatives from associations of the region concerned.

Does this mean that after 2 years of ferocious and almost unanimous opposition, the mayors and inhabitants of this upper region, located on the border of the departments of Allier and Loire, have obtained satisfaction on every point? It is not quite that simple.

Certainly the COGEMA project (Nuclear Materials General Company, a branch of the Atomic Energy Commission), which consisted of storing 300,000 cubic meters of atomic wastes of weak and moderate activity on the floor of a former uranium mine, is over. But the whole problem of radioactive residue remains. Therefore, the minister of energy has asked the AEC to prepare for him a comprehensive program for the management of these wastes, which apparently did not exist up until this time. This work should be finished in a few weeks and submitted for review to the Higher Council for Nuclear Safety.

Then, within this framework, the different storage sites existing in France, including that of Saint Priest, will be studied. The Bureau of Geological and Mining Research identified a dozen sites a few years ago. Many questions will be raised on this occasion: How to package the radioactive scrap? Must the wastes be stored on the surface or underground? Should the storage be permanent or temporary? How and by whom will the sites be monitored? In brief, the thorny question of "nuclear garbage" is to be considered from the beginning.

The choice of sites (two or three) would be reached in a year or 18 months. Herve has promised to make no decision without consulting local officials.

In any case, the sites decided upon will be endowed, like the reactors, with a monitoring commission composed of elected officials and association representatives. Finally, the minister has let it be known that, in conformance with the Socialist Party program, a nuclear law determining the powers and responsibilities of the various organizations managing nuclear energy would be introduced as soon as parliament's program permits.

Satisfaction

Upon leaving the Ministry of Energy, the people of Saint-Priest-la-Prugne--who had been received by the President 2 weeks ago--did not conceal their satisfaction. "The 1970 plan has been abandoned," declared Patrick Mann, leader of the Bois Noir collective. "All this is in response to the promises made by the Socialist candidates in April 1981. Politically, this is a very important advance. But that does not mean that every storage project in Saint Priest has been abandoned forever. As we are irreparably opposed to this idea, we will remain vigilant. We will rest easy only when the AEC has given ground."

The floor of the former uranium mine is still occupied by various buildings and shorings. The town of Saint Priest would like to set up lumber companies there which propose exploiting the immense forests of the Bois-Noir massif. There also remains a settling basin full of slightly radioactive sludge which it will be necessary to empty completely.

In this respect, the elected officials of Loire have learned that EDF [French Electric Power Company] had proposed installing a pumping station with two basins there. They have asked Herve for details on this equipment and were surprised not to have been informed earlier. "As long as the threat of a nuclear garbage can weighs on our territory, we will be able to undertake nothing; neither business installations nor tourist development, nor even a hydroelectric plant. It is necessary to be done with it as soon as possible," they concluded.

9865
CSO: 5100/2133

BRIEFS

PRONUCLEAR MOVEMENT IN BRITTANY--Saint Brieuc--"Plogoff is finished, but there is nothing but Plogoff in Brittany." Created last October, the France-Energy-Business [FEE] association, which has just opened a Breton branch in Saint-Brieuc, has proposed as its program to "defend the interests of businesses working for nuclear energy." For Travers, the president of the regional Chamber of Commerce and Industry, who welcomed the delegates from FEE and at the same time around 20 heads of businesses or professional representatives, it is the whole development of the Breton economy that is at stake in this energy problem. On the single level of employment (Plogoff would have represented 1,200 direct jobs over 6 years), the reduction of the electro-nuclear program has not been compensated for by any substitute program, particularly in Brittany, say the heads of business. Whereas, according to Lalitte, a member of the FEE office, Paluel and Penli in Upper Normandy have or are going to have direct repercussions estimated at between 1.6 and 3 billion francs. Starting from the principle that the decision taken will be in effect only over a 2-year period and that their arguments on the subject of employment and the economy would have found a favorable hearing in the ministries, the leaders of FEE have decided to adapt their strategy accordingly. After having established itself in Normandy and the East, the association now has two Breton delegates, Messrs Michel (Metallurgical Society of Brittany, Saint-Brieuc) and Lambremont (Regional Federation of Public Works in Rennes), and is preparing for a March release of a Lou Harris poll on the loss of jobs in the electro-nuclear program and for an April meeting in Lyon: "For 1982 and 1983, it's over. After that, not only is nothing lost, but everything is possible." [Text] [Paris LE MONDE in French 5 Mar 82 p 12] 9865

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BRIEFS

TERRORISM IMMOBILIZES NUCLEAR PLANT--Madrid, 11 May (AFP)--The military wing of the Basque separatist movement ETA has scored a major victory by rendering technicians at the Lemoniz nuclear power plant, crucial to Spain's energy supply, too terrified to work. Following the murder last week of technical director Angel Pascual Mugica, 90 technicians of the Iberduero Company went on strike yesterday. Iberduero owns the power plant, under construction near Bilbao in the Basque region of north Spain. Despite appeals from the Autonomous Basque Government not to yield to "terrorist blackmail," the technicians said in a communique that they could not live with "an unbearable family, personal and professional situation." Iberduero technicians, forced to live clandestinely, are tormented by both the fear of losing their jobs if they refuse to work and of being attacked. Since 1977, two engineers and three workers at the Lemoniz plant have been killed by ETA-M, the military wing of ETA, and frequently employees receive death threats. The killing of Mr Mugica occurred on the day that management of the Lemoniz plant was placed under the authority of the Basque Autonomous Government and no longer under Madrid. Since 1977 also, the terrorist organization has carried out 300 attacks against the plant and other Iberduero installations, causing damage estimated at about 29 million dollars. [Excerpt] [NC111556 Paris AFP in English 1528 GMT 11 May 82]

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END

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NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 147

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3 June 1982

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No. 147

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ANTI-NUCLEAR RALLIES HELD IN VARIOUS CITIES GET BIG CROWDS

Melbourne Demonstration

Melbourne THE AGE in English 5 Apr 82 p 3

[Article by Andrew Bolt] Many thousands of people marched through the city yesterday in a rally for nuclear disarmament. Police estimated the crowd at about 20,000. Rally organisers said more than 40,000 attended.

The rally stretched for seven city blocks as demonstrators walked slowly behind a drum corps, which beat a funeral march.

Police said the crowd was the biggest seen at a city rally since the Vietnam moratorium marches.

Below the forest of banners, flags and signs were mingled Franciscan monks, Spartacists, ALP and ACTU representatives, trade unionists, International Socialists, conservationists and church and student groups.

Nuclear war "victims" drew a cart bearing a figure of death and a large blackened globe of the world, as jazz bands behind played swing to the steps of hundreds of demonstrators packed around them.

The rally was to support the United Nations resolution calling for disarmament. Similar rallies in Sydney. Wollongong, Hobart, Adelaide and Perth have been held in the past three days.

The Melbourne rally began about 1.30 pm at the Treasury Gardens. A spokesman for People for Nuclear Disarmament, Dr Joe Camilleri, told the crowd they were there because they wanted to "reassert our common humanity".

Dr Camilleri, a senior lecturer in politics at Latrobe University, said the nuclear arms buildup now threatened the life of every person. "We reject this senseless race into oblivion," he said.

After a fiery Professor Manning Clark urged them to "say no firmly to death and destruction; say yes firmly to life and to love", the protestors began the march through the city to the Flagstaff Gardens.

There a retired West German general, Gert Bastian, told the crowd that the major powers had failed to grasp the dangers of the weapons they were stockpiling.

General Bastian, who resigned in protest against his country's deployment of United States nuclear missiles, said the world now stood at the crossroads between death and a future free of nuclear weapons. A further arms build-up would make a nuclear catastrophe inevitable. He said the major powers sought a security based or mass murder and fear of an imaginary enemy. "To threaten mass murder is not a morally justifiable way of ensuring peace," he said.

A lighter note was struck by the Anglican Bishop of Bendigo, the Right Reverend Oliver Heyward, who inadvertently referred to the "United Snakes". The crowd liked that.

Record Crowd in Sydney

Sydney THE SYDNEY MORNING HERALD in English 5 Apr 82 p 3

[Article by Richard McGregor]

[Text] Thousands of people marched through Sydney yesterday in support of nuclear disarmament. Police and march organisers said it was the largest rally in the City since the anti-Vietnam war demonstrations.

The march coincided with rallies throughout the country on the weekend, marking what organisers hope will be the beginning of a mass peace movement in Australia.

Police said the crowd in Sydney was between 20,000 and 30,000 people.

The promoters said more than 40.000 marched in the rain.

The march began at Circular Quay, and proceeded along George Street. It took almost two hours to pass the Town Hall. Organisers were enthusiastic about the turn-up, which they said was "beyond all their expectations."

The front line included the Labor MP, Mr Tom Uren, the author Mr Patrick White, the Deputy-Premier, Mr Jack Ferguson, Bishop John Reid, who was a leading candidate in the ballot for a new Anglican Archbishop of Sydney, and the head of the NSW Ministry of Aboriginal Affairs, Mrs Pat O'Shane.

Southern Hyde Park was overflowing with balloons, banners and placards for the speeches and entertainment at a rally later in the afternoon. Many people sat in the trees and at the War Memorial to view the stage.

Mr White, addressing the crowd as "fellow human beings," said nuclear war was the most serious issue that had ever faced the "global family."

"By now, Australia has become an important nuclear target, and nowhere have the people been consulted," he said.

"French nuclear tests will bring nuclear war closer to those who feel their island is inviolable."

Mr White attacked what he said was the lack of respect shown by uranium miners to Aboriginal land rights, and the people who he called the "Frankenstein consortioum of American millionaires who had launched on the world their monster, Ronald Reagan, a figure out of his own B-grade movies."

He called on all Australians to contribute "to the life force rather than collaborating in the death of the world."

Other speakers included Mr Peter Cook, the vice-president of the ACTU, and at the beginning of the rally, Mrs Pat O'Shane, and the federal secretary of the Seamen's Union, Mr Pat Geraghty.

They concentrated mainly on the issues of uranium mining, Aboriginal land rights, the arms race and military spending, and the threat of nuclear war.

Mr Cook said the money spent on nuclear arms meant a massive deployment of investment away from welfare to war.

The thousands, both old and young, who marched for peace yesterday came from broad sections of the community, ranging from many Church and union groups to islanders calling for a nuclear-free Pacific.

The Sydney march was organised and sponsored by 43 groups and individuals who were represented on a rally committee. They included environmental groups, a number of trade unions and Labor politicians, the Quaker Peace Committee, and the association, Arab Friends of Labor.

The main backing came from the Association for International Cooperation and Disarmament, the Uniting Church and key unions. The march was promoted by advertisements in the Sydney press, and paid for by groups representing among others, journalists, doctors and the Seamen's Union.

The chairman of the Sydney Rally Committee, the Senator Bruce Childs, said that he expected the success of the march would provide the impetus for the formation of a permanent group for nuclear disarmament.

March in Perth

Perth THE WEST AUSTRALIAN in English 5 Apr 82 p 3

[Excerpts] SYDNEY: Anti-nuclear marchers yesterday staged the biggest rally in Sydney since the days of the Vietnam moratorium demonstrators.

In PERTH, more than a thousand people scorned the heat and flies to march to the Supreme Court Gardens yesterday.

The protest rally was organised by the People for Nuclear Disarmament. WA groups taking part included Doctors against Nuclear War, United Nations Disarmament and Peace Committee, Community Aid Abroad, Campaign Against Nuclear Energy, WA Peace Committee and the Indian Ocean Peace Coalition.

In the heat of the afternoon the people, who were mostly young with children, listened to speeches from Senator Ruth Coleman, Dr Harry Cohen, Dr Keith Suter and Miss Louise Duxbury.

Telegrams from anti-nuclear organisations in the Eastern States supporting the Perth protest were read to the crowd which responded with loud applause.

Dr Cohen, the State organiser for the Medical Association for the Prevention of War, said that an unprecedented world mass movement was needed to stop nuclear warfare.

"It is up to the ordinary people to do something about the presention," he said.

Dr Suter, the president of the United Nations Association in NSW warned the people that they would be the victims in a nuclear holocaust.

CSO: 5100/7528

BRIEFS

NUCLEAR DISARMAMENT ISSUE--Australia holds an important place in the United States world strategy and as such can put pressure on the U.S. to reduce its nuclear arsenal, according to the president of the Association for International Co-operation and Disarmament, Dr. Keith Suter. Dr Suter is in Perth to speak at a rally to be held in the Supreme Court gardens on Sunday--National Peace Day. At a press conference organised yesterday by the WA branch of the People for Nuclear Disarmament group, he said Australians should be alert to the dangers of the arms race. It highlighted the risk of nuclear war through accident, computer-error or human failing. "What we must do is find a way of getting the super powers to co-exist so that they will reduce their nuclear stockpiles as well as their conventional armies." Dr Suter said. Dr Suter, the Dean of Students at Sydney University rejected the belief that the major powers need wars to bolster failing economies. "The Vietnam war came to an end because Wall Street joined the people and said that the war was too expensive. The same thing will happen with nuclear weaponry. The business community will say that it can no longer justify the expense of arms manufacture," he said. [Perth THE WEST AUSTRALIAN in English 2 Apr 82 p 17]

CSO: 5100/7528

RAO TALKS TO RAJYA SABHA ON TARAPUR AGREEMENT

New Delhi PATRIOT in English 1 May 82 p 6

[Text]

India is considering its future course of action regarding the 1963 Indo-US nuclear agreement as the United States has defaulted on its obligation to supply fuel, External Affairs Minister P V Narasimha Rao told the Rajya Sabha on Friday, reports UNI.

He said discussions had been taking place between the two governments to determine the future of the agreement but so far no decision had been taken.

Mr Rao said licences for a number of orders for spare parts for the Tarapur Atomic Power Station were pending with the US authorities for want of export licences.

Mr Rao said the inordinate delay by the United States in issuing such licences had caused difficulties in the operation of the Tarapur plant. But the Government of India would take all necessary steps to ensure that during the operation of the power station, the required safety regulations would be observed, he added.

He said the attention of the United States had been drawn repeatedly to the continuing delay in the supply of spare parts through diplomatic channels. The matter was also taken up during the Indo-US sub-commission meeting on science and technology in New Delhi in December 1981.

Since the prime contractors for the Tarapur plant are General Electrine of the United States in accordance with the past practice, the orders for spares had been placed with the US. They were still pending.

CSO: 5100/7091

PLUTONIUM-BASED FAST BREEDER REACTOR FOR 1983

New Delhi PATRIOT in English 6 May 82 p 5

[Text] India's first plutonium based Fast Breeder Test Reactor (FBTR) to generate power will go on stream at the Kapakkam Reactor Research Centre (RRC), near Madras, by the end of next year, reports UNI.

According to the 1981-82 annual report of the Atomic Energy Department, about 90 percent of the work on the FBTR is already completed.

Work at RRC is related to the development of various aspects of breeder reactor technology and as a part of these efforts the Centre is working on a prototype fast breeder reactor.

Fuelled by plutonium, the fast breeder reactors form part of the second phase of the country's nuclear power strategy enunciated by former Chairman of the Atomic Energy Commission (AEC) late Homi Bhabha.

In the first stage of the strategy, Pressurised Heavy Water Reactors (PHWRS) fuelled by natural uranium produced power and plutonium as by product.

The fast breeder reactors, besides generating power, will also produce more plutonium as well as uranium 233 from thorium placed in the blanket. All major reactor components for FBTR have been fabricated in India.

The AEC has drawn up a plan for increasing its installed nuclear power capacity to 10,000 MW by the turn of the century from the 860 MW being generated now.

Currently, two atomic power stations, the 420 MW Tarapur Atomic Power Station and the 440 Rajasthan Atomic Power Station, are in operation.

Two more, with a capacity of 470 MW each, were under construction in Madras and Narora in Uttar Pradesh. The department is also going in for yet another power station at Kakrapar in Gujarat with a capacity of 470 MW.

The first unit of the Madras atomic power project is expected to be commissioned this year. A little over 99 percent of the work of the unit has been completed. The second unit will go on stream in 1984 with about 85 percent of the work having already been completed.

Unlike the Tarapur power station, which use enriched uranium, all the nuclear plants in operations or under construction or planned would be fuelled by natural uranium and pressurised heavy water.

While the two units of the Narora atomic power project is expected to be commissioned in 1986 and 1987, the units of the Kakrapar project will start generation by 1990 and 1991.

Narora is also based for taking off on a 500 MW unit. Many of the components for the Narora plant have been designed to permit easy transition to the 500 MW size. The work of designing a 500 MW reactor is ready and 12 such units are planned before the turn of the century.

CSO: 5100/7093

ATOMIC ENERGY CHIEF HOLDS PRESS CONFERENCE

Madras THE HINDU in English 1 May 82 p 1

[Text]

HYDERABAD, April 30.

The Nuclear Fuel Complex (NFC) here has embarked on an expansion programme of doubling fuel production to 200 tonnes a year to meet the growing requirements of the various atomic power stations.

Dr. H. N. Sethna, Chairman of the Atomic Energy Commission (AEC) told a news conference here on Friday that additional facilities were coming up in the various fuel plants for this. He hoped the doubling of the capacity would be achieved in 18 months. The investment for the expansion programme would be Rs. 14 crores.

Asked about the supply of enriched uranium from the U.S. for the Tarapur atomic power station all that Mr. Sethna could say was that after October 1980, no further shipments had arrived and that 'no great hopes of continuance of supplies are held out'.

In the event of U.S. not making further supplies, India would manage with mixed fuel or reprocess the spent fuel.

Mr. Sethna said with the stoppage of supply of enriched uranium from the U.S. and to stretch the use of existing stocks, the generation at Tarapur was reduced by 20 per cent and was running at 50 per cent of the installed capacity of 420 MW.

Kalpakkam unit: He said the Kalpakkam atomic reactor near Madras would be operative by the end of the year. This was delayed for want of heavy water.

In the context of the perspective plan for raising nuclear power generation from the present 1,800 MW of installed capacity to 10,000 MW by the turn of the century, Mr. Sethna was asked to explain how this could be achieved with only the Ranapratapsagar and Tarapur plants actually operating.

Mr. Sethna tersely replied "by working like mad and making other people also work like mad".

Mr. Sethna said no decision was taken on the setting up of an atomic power station near Nagarjunasagar in Andhra Pradesh. Various States were offering to show 'suitable sites'. It was decided that the next atomic plant should be set up in South and the site selection committee would give its report in due course.

The AEC chairman who came here to participate in NFC Board meeting, chose to skip questions on recent mishaps at the NFC saying 'magisterial inquiry' was on. As an experimental measure, NFC had introduced use of water hyecinth in its water effluent treatment plants. The water hyacinth had the property of absorbing nitrates and heavy metals and cleanse the water which could be used for gardening.

Mr. Sethna said heavy water plants with a capacity of 200 tonnes a year were proposed to be set up at Manuguru near Bhadrachalam in Khammam district of Andhra Pradesh and at Thal Vaishet in Maharashtra.

Set up in a sprawling 800-hectare complex, NFC is one of the very few places in the world where the entire process starting from raw material to assembly of fuel bundles is made under one roof. NFC had started production of stainless steel tubes (2000 tonnes a year) and ball bearing tubes (21,000 tonnes). A plant for fabricating components for the fast breeding reactor coming up at Kalpakkam had also been set up at NFC.—Our Staff Reporter.

CSO: 5100/7090

PLANNING COMMISSION MEMBER WANTS INDIA TO GO NUCLEAR

New Delhi PATRIOT in English 3 May 82 p 10

[Excerpt]

India is in danger —the threats lie without, within, in its economic policies, its defence strategies, because of its friends and foes and most of all because of its people.

The country will have to weather the perpetual storm caused by the above problems and move on its path of development. a gathering of intellectuals and opinion builders felt at a seminar on Sunday.

The lengthy seminar on threats to national security and stability, organised by the Quami Ekta Trust, addressed itself to numerous causes of problems and groped for possible solutions.

Chairing the seminar, former bureaucrat and Planning Commission member P N Haksar dwelt at length on the causes of instability. Secularism in its true sense would be the right basis of true stability, but history had time and again shown that the concept of secularism in India was hung up only on religious tolerance.

Mr Haksar also spoke about the threat of thermonuclear weapons. If Pakistan, with its limited financial resources, had procured nuclear weapons, "India has a case to have it too," the felt

Looking at the international level of sophistication in nuclear weapons systems, the Indian concept of a nuclear implosion was primitive.

India's concept of a war, Mr Haksar said, was restricted to Indo-Pak exchanges only in the minds of the common people. They would have to be made aware of the dangers of the US military bases in the Indian Ocean, the struggle of the frontline South African countries fighting for their independence.

India, Mr Haksar regretted, had taken the back-seat in creating world opinion against the rigours of a nuclear war. It was time she called an emergency meeting of non-aligned countries and demanded the non-poliferation of the arms race.

On the national level, Mr Haksar felt, the present day political scenario had nothing new or substantial to offer as security to the nation.

The people had not been enthused into the task of nation building, they did not feel a sense of participation in creating their own destiny. The state of the bureaucracy as well as the institution of parliament was, almost one of decay which did not again infuse enthusiasm in the citizens.

CSO: 5100/7092

BRIEFS

HEAVY WATER PRODUCTION--India will achieve self-sufficiency in heavy water required for nuclear power plants with the setting up of additional heavy water plants, the Rajya Sabha was informed on Thursday, reports UNI. In a written answer Minister of State for Science and Technology C P N Singh said the heavy water plants at Talcher and Kota would be commissioned in the current financial year. Action had been taken for setting up two more heavy water plants with effective capacity of 295 tonnes per year. Additional heavy water plants would be set up to meet the cumulative demand of 13,000 tonnes of heavy water required for the power programme by the end of this century. [New Delhi PATRIOT in English 30 Apr 82 p 5]

NUCLEAR PLANT LIKELY FOR BHOPAL--BHOPAL, April 27--The country's second nuclear power research centre is likely to be located near Bhopal, according to State Government sources, reports UNI. Three sites were approved for the research centre by a three-member team of experts, which visited Bhopal last week. The sources told reporters that the team considered the availability of water, electricity, and land and communication facilities. The first research centre is functioning at Trombay. The site selection team was headed by Mr J. V. Pai, the joint secretary in the Ministry of Atomic Energy. Other team members were Mr V. K. Iyenger, the director of nuclear physics, Trombay, and the Amba Shankaran of the Bahba Atomic Research Commission at Bombay. The team also called on the Chief Secretary of the State Government and told him that about 2,000 men would be employed in the proposed research centre. Housing facilities would have to be provided for their families, sources added. The proposed research centre is in addition to the heavy water plant to be established in Madhya Pradesh. [Calcutta THE STATESMAN in English 29 Apr 82 p 12]

CSO: 5100/7088

INDIAN WRITER CLAIMS PAKISTAN 'DETERMINED' TO HAVE BOMB

Bombay THE TIMES OF INDIA in English 1 May 82 p 8

[Article by S. K. Sharma]

[Text] It is well known that Indians are divided on whether the government should go in for nuclear weapons. But hardly has any one disputed the veracity of reports that Pakistan is making a determined bid to acquire the bomb. Mr. Ravi Rikhye has now done so in your columns, ignoring the fact that the Pakistanis could not have been involved in so many clandestine deals in sensitive materials and equipment just for a civilian nuclear programme.

Mr. Rikhye's main case is that Pakistan does not possess suitable fissile material--enough enriched uranium and plutonium. It has been argued that the plutonium produced in the civilian reactors contains 'too high' a percentage of PU-240 isotope to be used for weapons.

This problem is not new; it has been there since the first-ever plutonium bomb was made and dropped over Nagasaki. The problem is also by no means insurmountable. The Manhattan project faced the plutonium-240 obstacle in that the spontaneous neutron emission rate of PU-240 made the gun-barrel system unusuable for a plutonium bomb. It got over it by inventing the implosion device (where concentric spherical, subcritical masses of plutonium are compressed by a chemical charge to produce fission).

Of course, the implosion device is relatively more demanding in terms of technological sophistication. For these reasons the first plutonium bomb needed to be tested whereas the first uranium bomb was delivered without testing. But it is not correct to argue that the PU-240 content precludes the making of a plutonium fission device. When one talks of Pakistan following the plutonium route, one tacitly implies that it would develop an implosion device to cope with the PU-240 problem.

PU 240 Content

What is the difference between the weapons-grade plutonium and the reactor-grade plutonium? The weapons-grade plutonium makes a very efficient bomb since the PU-240 proportions is considerably reduced by regulating the irradiation time of the U-238 fuel rods. In the reactor-grade plutonium this is not done. So the PU-240 content is high. In reality the Pakistanis are suspected to be attempting replacement of their fuel rods at regular intervals to reduce the PU-240 content.

Since Pakistan now has a fuel fabrication unit it is possible for them to carry out such replacements without being detected. The cause for suspicion is that the IAEA inspectors have faced difficulties in enforcing safeguards in the Pakistani reactors. The Pakistani authorities refused to agree to the IAEA's keeping the 'bundle counters' which could keep track of the fuel rods inside the reactor. About 200 to 300 days of irradiation time is adequate for getting plutonium with a suitable proportion of the fissile isotope.

Even in the worst case where the PU-240 content is not reducible to a minimum, a crude plutonium device can be made. To quote SIPRI, "a new nuclear-nation should be able to produce a 20-kiloton atomic bomb with a mass of about 1000 kg even at an early stage in its nuclear power programme." The only difference is that the 'critical mass' becomes high if the plutonium does not have a right isotopic mix. (In case of a bad mix, as high as ten times).

We must be clear that when we discuss the probability of a Pakistani bomb, we are thinking in terms of a crude device and not in terms of a warhead for a missile. But whoever talks of missiles while discussing the first bomb? After all, the Hiroshima bomb weighed 4000 kg and had an explosive power of 12 kilotons. It was utterly crude in comparison to the modern warhead which at 100 kg weight has a yield of 170 kilotons. According to a U.S. congress report on "nuclear proliferation and safeguards", "many nations are capable of designing and constructing nuclear explosives which could be confidently expected ... to have predictable and reliable yields in the kiloton range using reactor-grade plutonium."

Research Reactors

Let us look at Pakistan. The London-based Institute of Strategic Studies reported that Pakistan possessed about 30 kg of plutonium by 1980 which is expected to rise to 605 kg by 1984. It has power and research reactors to carry out the requisite experiments prior to a 'test' and its scientists are classified as 'very good'. In May 1979, the former U.S. assistant secretary of state, Mr. Thomas Pickering, had reported that Pakistan had perfected the blast wave detonation technique which is employed in the bomb trigger. A "Chritian Science Monitor" report in November last year gave an extensive description of the 'technology flow' to Pakistan through numerous subterfuges and agencies whereby the essential components of a bomb were slowly and steadily obtained.

The moment a country has enough plutonium it nears the fulfilment of her mission. According to SIPRI, about 8 kg of plutonium is enough for a bomb. So even if one were to increase this requirement by 10 times, Pakistan can still make a few bombs with 600 kg of plutonium.

As for the uranium route, there is no proof about any let-up in the Pakistani quest for setting up an enrichment plant. In spite of the U.S. attempts to to block uranium sales to South Africa, that country did succeed in securing enough enriched uranium for its Koeberg plant. Why should it be necessarily different in Pakistan's case? It is wrong to say, as Mr. Rikhye does, that the international black market in uranium is confined to uranium with less than three per cent enrichment. As high as 60 per cent enriched uranium has reportedly been available at a premium. Again, while 90 per cent enriched uranium is ideal for a weapon, lower percentages can still do for a bomb. Only the bomb will be heavier and clumsier.

A plutonium bomb made out of reactor-grade material poses considerable storage problems as the assembly gets over-heated due to alpha emission, creating difficulties in retaining the whole contraption for any length of time. Therefore one can reasonably assume that the explosion of a plutonium bomb, once produced by Pakistan, cannot be delayed beyond a point.

As for delivery, several aircraft apart from the F-16 can do it. During the Congressional hearings last year about the F-16 sales, Mr. Buckley had admitted that the aircraft would have bombing racks for a nuclear weapon. Mr. Daniel P. Moynihan in his speech had even warned of a full-fledged Pakistan nuclear force with the F-16s and the Saudi F-15s. The mirage 3's and mirage 5's can also be used.

CSO: 5100/7089

PROGRESS OF NUCLEAR INSTITUTE OF AGRICULTURE AND BIOLOGY DISCUSSED

Lahore THE PAKISTAN TIMES in English 14 Apr 82 p 4

[Editorial: "NIAB's Progress"]

[Text] A function celebrating the first decade in the life of Pakistan's Nuclear Institute for Agriculture and Biology (NIAB) provided President Zia-ul-Haq the opportunity to reiterate the country's commitment to bend nuclear technology to peaceful uses. Against the agricultural backdrop of the national economy, NIAB is the premier project of the Pakistan Atomic Energy Commission. The President complimented the scientists working at NIAB on their contribution to the modernisation of the country's agriculture and appealed to them to step up their efforts to tackle some of the problems lying at the root of our low productivity in the sector and to enable Pakistan to become an agriculturally surplus country commensurate with the proportion of its manpower engaged in the production of food. While the national economy has tackled the more sophisticated problems of industrialisation, it must now turn its attention to the relatively uncomplicated sector of agriculture. The President drew the attention of the scientists to the colossal damage caused each passing minute by water-logging and salinity in the cultivated areas and asked them to evolve an indigenous response to the menace. The second most serious threat to our agriculture, the water resource, its waste and mismanagement, is a double-edged blessing which must be scientifically harnessed to advance the sector of agriculture.

The world has so far developed 230 varieties of wheat through nuclear cytogenetic research. The right seed and its widespread acceptance by the farmer can guarantee a ten-fold increase in the production of wheat. Yet, seed alone cannot transform agriculture. The soil must be chemically fit to receive the seed. Parasitic weed and destructive insects must be extirpated to allow the seed to flourish in the soil and fertilisers must constantly strengthen the fertility of the soil to accelerate growth. NIAB, together with other organisations in the country, is trying to improve crop varieties and is doing it through genetic mutations in the seed. It has already developed mutations of Basmati rice which can be cropped twice in one season. It has also succeeded in evolving a short-duration, heat-tolerant and high-yielding mutant of cotton which has experimentally produced 50 maunds in an acre. It has cultured a special grass which flourishes in salt-dominated soil and lowers salinity and is experimenting with it on 150 acres acquired near Lahore Research on micronutrients is progressing rapidly to supplement the productive strength of the soil under cultivation. NIAB is also involved in the technology of food preservation and has successfully used radiation to arrest sprouting in such stored products as garlic, potato, onion, etc. Biotechnological research is devoted to the complex process of recombining DNA structures to produce varieties of botanical products to increase proportions of proteins and enzymes. In short, the institute is placed squarely in the centre of our plans to break out of stagnation in the domain of agriculture. According to the President, the Government will do whatever it can to promote the work being done at NIAB as Pakistan's contribution to the international movement to use nuclear technology for peaceful purposes.

CSO: 5100/5654

REVISION OF NUCLEAR POLICY SEEN AS RESULT OF FALKLAND CONFLICT

Buenos Aires CLARIN in Spanish 21 Apr 82 pp 16-17

[Article by Martin F. Yriart, a journalist specializing in nuclear energy and a consultant for the CNEA]

[Text] The Malvinas conflict has suddenly placed Argentina's nuclear policy in a new light. The importance of the nuclear sector should not come as any surprise, though, for two fundamental reasons.

The first is that a conflict about sovereignty affects not just the tiny portion of territory that is being disputed, but it also affects the entire nation involved, in a structural manner. The second reason is that nuclear development is a strategic issue, both in the broad sense of the term, and also in a more restricted, military sense.

On Tuesday, 6 April, at an interval of 4 days from the recovery of the Malvinas by Argentina, Argentina and the Soviet Union signed contracts for uranium enrichment and other nuclear supplies to be provided by the Soviet Union. It is assumed that the Soviet delegation consulted Moscow and received instructions to move ahead. For the Soviets, there is no overwhelming economic interest in this deal; it is simply a modest commercial operation. But for Argentina, it means a resolution of the crisis caused by the refusal of the United States to supply fuel for our research reactors.

That same week, the UNSCEAR [United Nations Scientific Committee on the Effect of Atomic Radiations], a major UN body, elected as its chairman an Argentine national, a top official of the CNEA [National Atomic Energy Commission]. A week later, another CNEA expert became president of the Latin American section of the ANS [American Nuclear Society], the regional nuclear technology organization. In both instances, individual merit was a decisive factor. But this is also a mark of recognition for Argentina's nuclear development and policy.

Sovereignty is not an abstract concept, but neither is it limited just to territorial issues. In response to Argentina's recovery of the Malvinas, there is now a plan to restrict our economic freedom by means of the trade embargo that the Commonwealth and the European Economic Community want to impose on us, at the urging of Great Britain. Both Japan and the USSR, along with some of the other industrial nations, have opposed this embargo.

Supplies

In principle, these measures should not affect contracts that have already been signed for Argentina's nuclear imports. Our country is now waiting for equipment and technology to be provided by the Federal Republic of Germany, Austria, and Switzerland, as well as from some of the other European nations, for the Atucha II nuclear power plant and the Arroyito heavy water plant. Some equipment is also expected from Canada, which will be used to put the Embalse Nuclear Power Plant into operation before the end of the year. Until a few months ago, the fuel for use in such power plants had to be imported from the Federal Republic of Germany.

The vigorous impetus toward self-sufficiency imparted by the CNEA during the past 6 years, an effort which has encompassed all fields (reactor design and construction, critical components, fuels, heavy water, uranium exploration and mining), should help to frustrate any attempted nuclear embargo.

The decision to promote an Argentine heavy components industry for nuclear power plants, which met with some criticism 3 years ago, has today demonstrated its value, and the subsidies granted were paid off at the same time as the EEC's economic sanctions against Argentina were announced. There can not be the slightest doubt that from now on, the policy of self-sufficiency in engineering, equipment, and nuclear supplies will continue, and will be improved wherever possible.

This is a credit to be held to use against future pressures. A credit Argentina has acquired by working diligently to develop the peaceful uses of nuclear energy, by denouncing discrimination and the arms race, and by helping other developing nations like ours to acquire their own experience and capability in this field.

But this still does not protect us against all risks.

The presence of British nuclear submarines in our territorial waters once again revives the issue of the meaning of the non-proliferation policy as stated in the TNP [Non-Proliferation Treaty]. About 10 years ago, when the TNP was drafted, there were some doubts expressed about whether naval nuclear propulsion systems were strictly for military use, or could also have civilian applications. Today, after the dismantling of the U.S freighter, the "Savannah," and the German "Otto Hahn," and the confinement of the Japanese vessel, the "Maru," there can no longer be any doubt that nuclear propulsion's sole application is as a component of an arms system, plus some other strategic applications (icebreakers).

The TNP favors the United Kingdom because, as it was drafted 10 years ago, it did not include that aspect. The same thing can be said about the Tlatelolco treaty--whose Protocols I and II were signed by Great Britain--for the same reasons. There is also the added irony that Tlatelolco places on the signatory countries which possess nuclear weapons such as the United Kingdom the obligation not to use them or threaten to use them against any treaty member. And now we have four, or perhaps even six British nuclear submarines invading Argentina's waters.

Even though they may not be carrying any atomic missiles, still these British submarines do constitute a serious threat against our nation in the nuclear field. It is a macabre sort of paradox that if an Argentine ship, operating in either confined or shallow waters, were to seriously damage a British submarine with nuclear propulsion, this would create the risk of releasing highly radioactive materials from the nucleus of the reactor, which could produce environmental damage of a magnitude difficult to predict. In a nuclear war this risk is minimized in comparison with the damage that may be produced by atomic bombs, but that is not the case here.

A recapitulation of all this shows that our nuclear policy has won us respect and support, especially among the developing nations. Today our non-proliferation position is accepted by nations such as the Soviet Union. If not, they would not provide us with assistance in the nuclear field. Our nuclear development frees us to a great extent from external pressures, but despite all that, we are still vulnerable to a power such as Great Britain which, just by bringing nuclear submarines into our waters, threatens us with an atomic stranglehold.

We have demonstrated our sincere support for the principles of the non-proliferation of nuclear weapons by our actions. It is now up to Great Britain to demonstrate that, in addition to signing treaties, it intends to comply not only with the letter, but also with the spirit of these treaties. The Malvinas conflict is a territorial dispute between two nations. But this nuclear threat presents a risk for all humanity.

7679
CSO: 5100/2166

DEVELOPMENT OF NUCLEAR WEAPONS IN SOUTH AMERICA ANALYZED

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 29 Apr 82 p 9

[Commentary by Rubens Rodrigues dos Santos: "Nuclear Weapon on the Continent"]

[Text] News reports from the theater of naval operations in the South Atlantic inform us that Britain has four nuclear submarines there, a fact that perhaps has led the chairman of the Argentine National Atomic Energy Commission to hasten to declare that his country is in a position to build atomic weapons. Immediately afterwards, it was reported that Soviet nuclear submarines were operating in the Malvinas region and that the USSR placed itself at the side of Argentina "against the colonialist aggression of Britain and its U.S. partner."

Obviously Vice Admiral Carlos Castro Madero knows very well that the designation of nuclear submarine does not necessarily mean that there are atomic weapons aboard because what really gives that war vessel that name is the nuclear reactor that provides its propulsion. On the other hand, the Soviets and British also know that fact very well but prefer to continue to keep up in the air the question: is there really a possibility of a nuclear conflict breaking out in the South Atlantic?

After its communique, which opened the era of nuclear weapons in South America, is Argentina in a position to confront the British with atomic weapons? Would Britain, which even has thermonuclear bombs in its arsenals, dare to use them? And under what circumstances would the Soviet Union intervene in the conflict? Finally, what position would the South American countries find themselves in, particularly Brazil, in that intricate preliminary game in which persuasion and deterrence have not yet made themselves felt explicitly?

It is well to reiterate once again that we are not driven by any intent to create any offense between the fraternal peoples of Brazil and Argentina. On the contrary, we believe that the calm and careful examination of a matter of such importance as well as its clarification before the public in fact represent an effective action to prevent possible impulsive acts that could lead to points of difficult return, as is occurring today in the Malvinas crisis.

Position of Brazil

Brazil could not in any way remain indifferent to what was being done on the other side of the River Plate during the last decade and which was finally confirmed by the chairman of the National Atomic Energy Commission of Argentina, our partner in the friendly game that is taking place on the chessboard of South American geopolitics in a suitable or unsuitable manner, striking it right here and committing mistakes there, spending what it could as well as what it could not (for the time being, let us disregard the merit and deal only with the de facto situation), our country perhaps is in a position today--or it will be in a short time--to take the same political decision as Argentina and thus to get a plutonium-fission atomic bomb.

To those who refuse to view this question pragmatically, we would say once again that it is necessary to be frank and to face the problem directly, without beating about the bush and without false modesty. If the assumptions made in the preceding paragraph may not be valid today, there is no doubt that they will be so in the coming years. It is valid, therefore, to discuss this inevitability of our times: Brazil and Argentina, both of them possessing one or more nuclear-fission weapons, are the largest, most populous and richest in South America. They have long common borders and some potentially conflicting economic interests. Their peculiar sociopolitical structures, depicted in different demographic charts (125 million and 40 million inhabitants, respectively), may evolve slowly or rapidly in unexpected configurations. In addition--as we stressed in a previous article--the predominant nature of the officers of the respective armed forces reveal some marked differences.

Furthermore, there is an aspect of the nuclear question in South American that transcends Brazil-Argentine geopolitics: the clear possibility of the occurrence of another chain reaction; not that caused by the neutrons colliding with the nuclei of plutonium--which is easy to control--but rather a chain reaction generated by elementary human impulses, often unforeseen and uncontrollable, strongly aroused on our continental stage by nebulous antagonisms transformed into alleged reasons of state: first Chile, because there is the dispute over the Beagle Channel; Peru wants to regain the territory of Arica and quarrels with Ecuador over the El Condor cordillera; Bolivia continues to dream of regaining an outlet to the sea; Colombia is going through one of the most serious internal convulsions in the Americas; and Venezuela is threatening to invade Guyana to regain the Essequibo region.

From all appearances, in the future, it will not be necessary to have much more than a good nationalistic-type impulse--of those common in Latin America--and 1 kilo of nuclear pure plutonium properly packaged in an electromagnetic device for us to face the worst....

Can anyone doubt that South American geopolitics, still in this century, could come to be defined preponderantly on the basis of that tragic succession of antagonisms, which will certainly be negotiated and decided by the military men and politicians we know so well, marked by "South Americanism," all of them, by that time, grasping the reasons impulsively concocted by them in one hand and their home-made atomic bombs in the other?

8711
CSO: 5100/2162

KWU RECOMMENDS DEVELOPMENT OF JET-NOZZLE ENRICHMENT PROCESS HERE

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 27 Apr 82 p 36

[Text] Rio--The representative of the Kraftwerk Union (KWU) in Brazil, Engineer Wolfgang Breyer, said yesterday that even if the jet-nozzle process for the enrichment of uranium purchased from Germany by Brazil is uneconomical, it needs to be developed by Brazil to guarantee the independence and self-sufficiency of the nuclear program. He pointed out that Germany has been exploiting coal, which is not economical, to guarantee its independence in that sector.

According to Breyer, Brazil was not in a position to develop any other uranium enrichment process. All the other doors were closed to Brazil, which "took the last bus in the world to obtain sensitive technology." He stressed also that the jet-nozzle process is one of the easiest to maintain under safeguards and any attempt at enrichment that was not for peaceful purposes would be discovered.

In the opinion of the KWU representative, the jet-nozzle process can produce highly enriched uranium sufficient for nuclear devices but it is much more difficult than the ultracentrifugal method. Because the jet-nozzle process requires a fixed installation of 300 to 400 stages, all in series, nothing in parallel, while the centrifugal process requires 10 stages which can provide for other parallel stages that could escape the control of the International Atomic Energy Agency (IAEA).

The jet-nozzle process requires large quantities of uranium to enrich very little while the centrifuge works with small quantities but achieves a high degree of enrichment.

Easy Inspection

In Breyer's opinion, "it is easier to inspect the jet nozzle to guarantee the safeguards, and neither Brazil nor Germany want to burden the nuclear agreement with suspicion." The engineer pointed out in that connection that for the enrichment of uranium for peaceful purposes on the basis of 3 percent, the jet-nozzle process does not present any disadvantages compared to the other methods.

Breyer believes that URENCO's ultracentrifugal technology established for reasons of self-sufficiency became competitive in time and was successful in the world market. In Breyer's opinion, there is nothing to prevent the same thing from happening with the development of the jet-nozzle process by Brazil. The KWU representative also identified economic interests outside the country that want to discourage it as well as its technological partner, Germany, from developing that process.

He admitted, however, that the jet-nozzle process will never achieve the low levels of energy consumption presented by the centrifugal process although it shows a potential in time to achieve the level of the gaseous diffusion process used by the United States.

Delay of Plants

With regard to the possibility of Brazil delaying the construction of the Iguape-1 and -2 plants until after the jet-nozzle process has proved its industrial efficiency, Wolfgang Breyer said that the commercial contracts between the KWU and the Brazilian Nuclear Corporation (NUCLEBRAS) for those two new plants have not yet been signed. But he pointed out that their delay would interrupt the continuity of the nuclear program and that NUCLEBRAS had already begun the contruction of the components of the Iguape-1 reactor in the NUCLEBRAS Heavy Equipment Corporation (NUCLEP) factory in Itaguai.

8711
CSO: 5100/2162

ANGRA-I TO REMAIN IN TEST PHASE THROUGH END OF YEAR

Rio de Janeiro JORNAL DO BRAZIL in Portuguese 17 Apr 82 p 19

[Text] Belo Horizonte--The president of the Furnas Electric Power Stations, Licinio Seabra, revealed in this capital yesterday that the Angra-I nuclear plant will not be released for operation until the end of this year or the beginning of 1983. Until then, according to him, it will remain in the testing phase until modifications are made in the steam generator.

He revealed that Westinghouse technicians will come to Brazil early next month to discuss with Furnas specialists what modifications will be made in the steam generator "to prevent the problems that have occurred in other countries." According to him, after the modifications, the plant will remain in the testing phase until the end of the year.

Jeopardy

The president of Furnas admitted that the Itaipu Binational is facing "cash-flow problems," having ended March with a debt of 8 billion cruzeiros to its contractors. He said that, for the time being, no hydroelectric project was affected; "there is only concern."

Mr Licinio Seabra also revealed that the lack of financial resources may "jeopardize" fulfillment of the timetables for completion of the transmission lines under the responsibility of Furnas, which continues its normal timetable of works for Itaipu. During a lecture in the international symposium "City and Energy," the president of Furnas pointed out that there must be a limit to the concentration of populations and decentralized industrialization.

He supported measures to prevent the growth of cities, speaking of studies that estimate that by the year 2000 there will be 25 million inhabitants concentrated in Sao Paulo and 20 million in Rio. He considered that the oil crisis marked the end of a phase of cheap energy and recognition of the limitation of nonrenewable energy resources.

8711
CSO: 5100/2162

AMMONIUM DIURANATE PRODUCTION TO BEGIN 5 MAY IN POCOS DE CALDAS

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 2 May 82 p 71

[Text] When President Joao Figueiredo inaugurates the industrial complex built by the Brazilian Nuclear Corporation (NUCLEBRAS) in Caldas, in southern Minas Gerais, on Thursday, Brazil will begin to produce the ammonium diuranate which, enriched in Europe, will serve as fuel for the nuclear reactor for the production of energy.

NUCLEBRAS developed the project 5 years ago, which represents the implementation of the first phase of the sophisticated, very costly and controversial nuclear fuel cycle. As in all inaugurations of public works, the atmosphere will be a festive one. That was implicit in the statements of NUCLEBRAS officials, who accompanied a group of 15 reporters to the site last Thursday.

Statements such as "that is a response to those who do not believe in the success of the program," or "there is the proof that we can become independent in nuclear technology" were repeated in informal talks with the reporters after a 4-hour tour of the highland. In that area, situated 30 kilometers from Pocos de Caldas, there were volcanic eruptions in another geologic age and today there is a deposit of 26,800 tons of uranium. Between the mining activities and those for the production of the "yellowcake," NUCLEBRAS and the contractors employ 860 persons, the majority recruited in the area itself, 90 of them top-level and 150 mid-level personnel. For the peaceful residents of the nearby cities, the operation of the complex does not represent anything more than the hope of employment, inasmuch as the other industries are not absorbing manpower as before and the rural exodus has intensified.

Uranium

The conventional festive atmosphere began in December of last year when the first 200 kilograms of yellowcake was produced, an insignificant amount compared to the operational capacity of the plant, which is 500 tons a year, operating 24 hours a day for 300 days.

The NUCLEBRAS facilities on the Pocos de Caldas highland--which include laboratories and support units such as the sulfuric acid plant--may be used until the year 2000 if the plant is operated at full capacity. Uranium is associated there with other ores, such as zirconium and molybdenum. At the same time, that plant will produce an alloy of zirconium which has an application in the nuclear industry and in the manufacture of thermal insulators, as well as calcium molybdate, used in the cosmetics industry.

For some years, it will be sufficient to use only one deposit, that of Campo do Cercado, where uranium was found beginning in strata 40 meters deep. Removal of the raw stone will be done in the open-pit style. (The natural radioactivity is considered to be below the 2.5 mR allowable according to international convention.) In the future, there will be a single, gigantic pit with a rim area of 315,000 square meters and a depth of 300 meters, where the mineralized block ends.

Exploitation is possible now after the removal of a volume of 30 million cubic meters of burden in the premining phase, three times the amount used in the construction of the Furnas plant dam. Once the ore is reached, there are 55 million cubic meters to be removed with dynamite and transported in 35-ton trucks under radiometric control.

Once the primary stage of the mining is concluded the rock is crushed, being transformed into grains a maximum of 20 centimeters in size, and in the next phase, as small as 6 millimeters. The ground ore is added to water in a proportion of 45 percent liquid and 55 percent solids, resulting in a dark soupy mixture pumped to the plant through an ore pipeline 2 kilometers long.

The soft mass is ready to receive the chemical treatment that will result in the yellowcake. Initially the slurry enters a solution to filter the solid material composed of uranium, molybdenum, zirconium and impurities such as iron. Using organic resins, uranium and molybdenum are absorbed and later, by washing with other reagents, the uranium is separated. Ammonia is added by means of a precipitation process producing the ammonium diuranate in the form of a yellow paste which, after drying, results in the powder that is ready for marketing.

The yellowcake has to be enriched in order to be transformed into fissionable material suitable to be used in the nuclear reactor because in its natural form it contains only 0.7 percent fissionable uranium.

8711
CSO: 5100/2162

BAHIA MAY SUPPLY MATERIAL FOR SECOND 'YELLOW CAKE' PLANT

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 30 Apr 82 p 29

[Text] Pocos de Caldas--The superintendent general of mining engineering of the Brazilian Nuclear Corporation (NUCLEBRAS), engineer Jose Milton Sampaio, acknowledged yesterday that the uranium reserve at Lagoa Real in southern Bahia may serve as the raw material for the second Brazilian plant to produce yellow cake, beginning in 1987. According to him, the probable advantage of the Bahian reserve over that of Itatiaia in Ceara is due to the characteristics of the ore deposited there, which permit the preoperational tests to be made in the pilot plant of the Pocos de Caldas highland complex. This unit serves as the parameter for the first yellow cake plant in the country, which is to be opened next Thursday by President Joao Figueiredo in the Minas municipality of Caldas.

Yesterday, NUCLEBRAS permitted reporters to visit the area 32 kilometers in diameter in a volcanic region near the Pocos de Caldas resort and located for the most part in the neighboring Caldas to familiarize themselves with everything from extraction of the raw stone by dynamiting to the industrialization of ammonium diuranate (the yellow cake), stored in 200-kilogram drums and kept in a storage shed.

That is where the material will remain until it is sent to France and Britain for the enrichment phase because Brazil will not have mastered that stage until the completion of the Resende plant. With enrichment, the uranium becomes fissionable and can go into the nuclear reactor.

Advantage

According to NUCLEBRAS, the Itatiaia reserve is the largest in the country with 137,500 tons and the uranium is found easily on the surface unlike that of Pocos de Caldas, where excavations over 50 meters deep are required to reach it.

What the NUCLEBRAS experts are arguing is that its use in this decade would necessarily mean the construction shortly of a new pilot plant owing to the association of the uranium with phosphate. That would mean a delay of at least 1 year for the beginning of the commercial production of yellow cake in addition to larger investments.

Therein lies the advantage of Lagoa Real, in the opinion of Milton Sampaio. The Bahian reserve has only half the potential of the Ceara reserve, about 63,000 tons. The forecast is that, in his opinion, the Brazilian nuclear program will be requiring the second plant by 1987--that is when, according to the timetable, the Angra-II plant will be operating commercially, followed by Angra-III in 1988.

President Figueiredo will officially put into operation the different phases of the yellow cake production process in Caldas.

8711
CSO: 5100/2162

NUCLEAR TREATY SIGNING DEPENDS ON RELIABLE U.S. ATTITUDE

Johannesburg DIE VADERLAND in Afrikaans 19 Apr 82 p 12

[Editorial: "The Nuclear Nonproliferation Treaty"]

[Text] Conspicuous efforts are now being made by the Reagan administration to persuade South Africa, through pressure and sympathetic approaches, to sign the Nuclear Nonproliferation Treaty. It is more difficult to refuse such a request by a proven friendly disposed administration than if the request came from an inimical one.

However, we realize that even the U.S. policy toward South Africa is based on that country's own interest, and if it is in that country's interest to turn against South Africa not even the Reagan administration will hesitate to do so.

Thus in its decision about signing the Nonproliferation Treaty South Africa must also put its own interests above all.

Our declared policy is to use nuclear power for peaceful purposes and that is also being done. However, the possibility of being able to become a military nuclear power is a valuable deterrent especially in light of Russian expansionism and the arms buildup in Africa, even in some of our neighboring countries.

Finally we should also not forget the fact that, despite its friendly attitude, the U.S. still maintains an arms boycott against us and is still denying us enriched uranium for peaceful purposes.

7964
CSO: 5100/5651

NUCLEAR POWER IS ESSENTIAL FOR GROWTH, ASSERTS ELECTRICITY CHIEF

Johannesburg DIE TRANSVALER in Afrikaans 7 May 82 p 2

[Text] Jan Smit, chairman of the Electricity Supply Commission (ESCOM), declared yesterday that a minimum of 20 power plants, each with a generation capacity of 3,600MW, will have to be built to cope with the anticipated growth in energy consumption over the next 25 years.

Moreover, attention will have to be given to the role of nuclear power in the foreseeable future. It appears as if nuclear power will have to be an essential and inescapable part of the country's energy sources, according to Smit.

The long-term character of energy supplies makes it imperative to place orders now for power plants that will be put into operation in the second half of the next decade.

Smit's annual report revealed that in the year ending December 1981, ESCOM had sold nearly seven percent more electricity.

That is under the annual average of 8.2 percent over the preceding five years. The reasons given for the decrease are the reduction in economic activities experience by South Africa since the start of 1981.

According to Smit, "the decreased rate of growth in energy consumption is chiefly due to the worsening recession in industry and its impact on South Africa's export market."

It was also revealed that ESCOM's total revenue in 1981 totaled R2,142 billion, an amount less than what was budgeted for. This reduced revenue was blamed on the unanticipated decrease in energy sales, inflation and the increased cost of money for financing capital needs.

Fixed expenditures in 1981 totaled nearly R1,951 million, [illegible] total fixed assets at yearend amounted to R10,144 billion. R3,721 of this sum was for work still in progress.

Operating costs also were in the red because of unreliable supplies from Cabora Bassa and the resulting operation of ESCOM's older and less economical power plants. In order to meet the energy shortage head on, ESCOM has instituted extra overtime for maintenance and speeded up its construction program.

CSO: 4701/75

RADIOACTIVE WASTES FROM KOEBERG WILL BE NONPOLLUTING

Capetown DIE BURGER in Afrikaans 22 May 82 p 11

[Text] The radioactive wastes that will be released into the ocean and into the atmosphere by the Koeberg nuclear power plant will not lead to pollution of the environment. All the same, the environment will be constantly monitored for radioactivity. These statements were made yesterday by Minister for Mineral and Energy Affairs, F. W. de Klerk, in reply to a query in the House of Assembly.

In reply to still another part of the question by John Malcolmess (PFP, Port Elizabeth-Central), de Klerk stated that radioactive waste products will be buried on the grounds of the Koeberg plant under stringent radiation control guidelines, so that there will be danger posed on or from the Koeberg premises.

Only liquids containing extremely low radioactive residues, within the limits fixed and enforced by the Atomic Energy Board in compliance with internationally accepted standards, will be released into the Atlantic Ocean.

Marinelife and ocean sediments will be monitored regularly to ensure that there is not increase of radioactivity in the surrounding waters. According to de Klerk the liquids are not considered radioactive wastes in the true sense of the word.

Only "inert" radioactive gases that are non-contaminating will be released into the atmosphere. The gases will not concentrate in the environment. The releases will be staggered over time and at a rate that is within the limits fixed and enforced by the Atomic Energy Board in compliance with internationally accepted standards.

De Klerk declared "this release will not perceptibly increase the background radiation level on the fringe of the Koeberg site. Still, as a further preventive measure, flora and fauna will be monitored regularly for changes in radiation levels. The releases will constitute no threat to public health and safety."

Waste products of "low and intermediary activity" will be buried on Koeberg property. They will consist of spent resins from water treatment facilities that are mixed with cement and then sealed in a thick-walled cement drum. Also included are crushed overalls, paper and other contaminated materials that will be sealed in steel drums.

"Stringent radiation control measures are applied in the burial of the waste and there is no chance of danger either on or from the site with that sort activity," asserted de Klerk.

CSO: 5100/5657

BRIEFS

N-PLANT SECURITY BROKEN--Cape Town--Three men using false identity documents breached the high-security system at the Koeberg nuclear plant near Melkbosstrand this week, overpowered a guard and tried to force open a safe. Details of the break-in, which occurred early on Monday, were released yesterday following an investigation. The Boland police liaison officer, Major George Kershoff, said three men entered the grounds of the nuclear plant--which comes on line next year--at about 4.15am on Monday. They broke into an office and attacked a guard, Mr Sampson Thobi (55). They hit him over the head with a hammer and then tried to force open a safe in the office. Mr Thobi managed to raise the alarm and help arrived. Koeberg security guards arrested a man. Two men escaped. An Escom spokesman, Mr G.J. Roussouw, said the break-in had occurred at the offices of an engineering subcontractor at the site. "It was a trivial matter and not Koeberg's indaba," he said.--SAPA. [Text] [Johannesburg THE CITIZEN in English 20 May 82 p 8]

NUCLEAR ACCIDENTS--House of Assembly--No insurance scheme providing cover for people against accidents at nuclear stations would be introduced by the Government, the Minister of Mineral and Energy Affairs, Mr F.W. de Klerk, said yesterday. Replying to a question by Mr John Malcomess (PFP Port Elizabeth Central) whether his department intended to introduce an insurance scheme providing cover for private individuals and property owners suffering harm or loss from accidents at nuclear stations, Mr De Klerk said that in terms of the Nuclear Installations Licensing and Security Act, liability for accidents rested with the licensee. Mr Malcomess asked him if he was aware that a number of insurance companies specifically excluded damage resulting from nuclear accidents from their policies. The Minister replied that the act contained a clause providing for comprehensive insurance. [Text] [Johannesburg THE CITIZEN in English 20 May 82 p 4]

MORE NUCLEAR POWER--Pretoria--Dr Ampie Roux, chairman of the Uranium Enrichment Corporation, has stated that in the future South Africa will increasingly use nuclear power to generate electricity leading to the construction of more nuclear power plants there. Dr Roux will be retiring at the end of June and in an interview he said that South Africa will have to construct larger uranium enrichment facilities to provide fuel for the nuclear power plants. [Text] [Capetown DIE BURGER in Afrikaans 22 May 82 p 11]

FUTILITY OF NUCLEAR IMPEDIMENTS--It has come to light that for some time U.S. brokers have been helping South Africa obtain enriched uranium for its nuclear power generators. This has been happening notwithstanding U.S. refusal to collaborate with the republic, because of the fact that we have not been willing to sign the nuclear nonproliferation treaty. Two things deserve special attention in this matter. The first is that the U.S. refusal to supply enriched fuel for the Koeberg development has not halted this enterpirse. South Africa has been able to obtain the necessary fuels from other sources even through the mediation of U.S. companies and this shows that boycotts seldom, if ever, succeed. Welcome is also the fact that the present administration has assumed a more balanced view with respect to the actions of the above-mentioned brokers. At any rate they are not violating the regulations of the nonproliferation treaty. Moreover, there are other entities in the rest of the world who would be willing to provide the same services. [Editorial: "Thoughts on Nuclear Matters"] [Text] [Johannesburg DIE TRANSVALER in Afrikaans 16 Apr 82 p 8] 7964

CSO: 5100/5651

HISTORY OF NUCLEAR COOPERATION WITH ARGENTINA

Hamburg DIE ZEIT in German 30 Apr 82 pp 9-11

[Article by Guenter Haaf and Josef Joffe: "The Karlsruhe Connection--Did the Germans Really Help the Argentines To Produce a Nuclear Bomb?"]

[Text] As England's naval fleet was still steaming toward the Falklands, Britain was already sustaining its next fateful adversity. Under the title of "Germany and the Argentine (Nuclear)-Bomb" the BBC last week "revealed" a horrible nuclear weapons conspiracy between Bonn and Buenos Aires. BBC reporter Robin Denselow took one hour to trace with his camera a trail which led from Wuerttemberg's Haigerloch to the Argentine pampas, from the nuclear labs of the Third Reich via Franz Josef Strauss to the presumed bomb factories of the Argentine junta. Germany, according to this colorful "political mystery story" (as government spokesman Ruehl called it), had been helping the Argentines to produce their own nuclear bomb for almost 40 years.

The British Foreign Office, which at this moment has a lot of other Argentine worries, still found the time to acknowledge that the Germans were acting "responsibly." But the English elite press took this chilling scoop, the "frightening revelation" (as the BBC touted it) at face value. "A hair-raising story," the London TIMES called it. And the Manchester GUARDIAN accepted, without further research, the thesis of an illegal Argentine "secret treaty with Germany."

The BBC people had conducted their research for 9 months; then, according to the FRANKFURTER ALLGEMEINE ZEITUNG, they let the "stink bomb" explode at the proper time. "I don't wish to say," said BBC producer David Taylor, "that we are holding the FRG directly responsible for this scandalous story. However..."

Millions of patriotically excited viewers learned last week that

- nuclear researchers of the Third Reich had fled with their research papers to Argentina in time and had continued to tinker with the bomb there--in the service of the coming "Fourth Reich;"

- a number of "veterans" had, after the reestablishment of FRG sovereignty (1955), regained employment and esteem at the Karlsruhe nuclear research establishment, whence during the 1960's they conducted a secret transfer of bomb technology to Argentina;

- the Argentines would shortly be in a position to build their own bomb--thanks to the Germans' ruthless commercialism.

What are the facts, and how much of this is pure speculation?

The history of German-Argentine cooperation in nuclear technology partly reads like the scenario of a Marx Brothers movie: lots of action and not much content--the cast includes charlatans and conspirators, old Nazis and Jewish scientists, ambitious research administrators and South American dictators.

Clear connections are difficult to perceive, but ghostly tie-ins are much easier to make. At a closer look, the thick gas clouds begin to dissolve. What is left are vested interests, confused research policies and swaggering Argentine national pride. The residue is nuclear technological know-how in the hands of an ambitious, restless nation: Argentina.

The game of confusion between Rhine and Rio de la Plata is played in three phases:

Act one shows Nazis and refugees from the Nazis, adventurers and scientists looking for a new start. During the unstable postwar period, all of them are trying to settle down in Argentina.

In act two, the direction of travel is reversed. The newly independent FRG entices with its beautifully equipped, fast growing nuclear research centers. Old ties are of advantage to both sides.

The third act, still ongoing, is already proving that the danger is not over. On the contrary: after 3 decades of close collaboration with Germany Argentina does not have a bomb; but it does have the technological capabilities and facilities for producing the big one in case of need.

I

It is a fact that after 1945 Adolf Eichmann was not the only man to find refuge in Argentina. Among the fast travelers from the 12-year Reich were also Nazi hero Hans Rudel, aircraft builder Kurt Tank (who developed the first Argentine combat jet plane) and physicist Ronald Richter. They were followed in 1949 by nuclear chemist Walter Seelmann-Eggebert. His invitation to Tucuman University came about through the recommendation of an Austrian Jewish physicist named Guido Beck.

"As far as I know," says Seelmann-Eggebert, I was at that time the only German in Argentina who knew anything about nuclear matters." It took 2 years after his arrival in Tucuman before the Argentines realized that they had a pioneer of nuclear research in their country; they appointed the former colleague of uranium-splitter Otto Hahn to the Argentine National Nuclear Energy Commission in 1951. That commission's first task was to perform some entirely non-scientific cleanup work: it had to disguise Argentina's first interest in the nuclear bomb. In the confusion of the postwar period the Czechoslovakian Ronald Richter, a student of today's GDR star researcher Manfred von Ardenne, landed in Buenos Aires also. This student, who had previously been stranded in Prague and Vienna, told Argentine dictator Juan Peron some tall tales about "controlled fission energy" with which he proposed to provide the South Americans with the hydrogen bomb, among other things.

Richter "completely snowed" Peron, reminisces Professor Pedro Waloschek, an Austro-Argentine, who at that time embarked on studying physics in Buenos Aires and who today is working at Hamburg's DESY high energy physics laboratory. The dictator generously built a huge laboratory in southern Argentina's Bariloche for the "charlatan" (as Seelmann-Eggebert refers to him). Richter ordered an impressive array of expensive equipment, some of it containing gold and platinum electrodes. With great fanfare, he arranged this instrumentation in sort of a Potemkin-type laboratory. When Argentine physicist Otto Gamba finally managed to inform Peron that Richter's enterprise was nothing but a fraud, none of the equipment in Bariloche had been connected. Small wonder: the expensive gold and platinum electrodes had disappeared.

Apart from the refugees from the Nazis and the emigrants who were simply looking for a new start in life, there were also hordes of old Nazis in Argentina--some of them linked as members of an SS overseas organization. The weapons specialists among the old comrades had resumed their war production activities far from the strange Argentine nuclear scene: in aircraft construction, in electronics and in conventional firearms. It was not surprising that they were totally ignorant of modern nuclear science: as far as the Nazis were concerned, the formula for converting mass into energy ($E=mc^2$), which is the basis of all atomic bomb construction, was nothing but "Jewish physics."

What were the Germans working on in those days? In an interview with ZEIT, Antonio Carrea, a member since 1954 of the Argentine National Atomic Energy Commission (CNEA), had this to say: "They were mostly engaged in isotope research and trained the first generation of our nuclear scientists. Toward the middle of the 1950's they returned to Germany."

But the Germans were not the only ones who introduced the Argentines to the nuclear age in those days. Young Argentine scientists swarmed all over the United States, England and Canada. The first research reactor was delivered by the United States in 1956. This one and its four successors (built in Argentina) were operated until early this year with enriched uranium made in the United States. When the United States stopped its export the Russians took over--in recognition of Argentine help in breaking the U.S. wheat embargo decreed by Jimmy Carter. The Germans were, and still are, in good company.

II

What remains of the Nazi tie-in? Mainly a gentleman by the name of Walther Schnurr, self-proclaimed "pope of explosives" in a top level position with IG Farben, who was used in the BBC broadcast as a string puller and star witness. Walther Schnurr, now 77, considers Argentina his "second fatherland," a country "where in those days (during the Peron era) one had no political difficulties."

The BBC people considered the former German decathlon champion and extremely talented chemist (who has more than 50 patents to his credit) to be the main link between German and Argentine nuclear ambitions, for practical purposes ever since the collapse of the Third Reich. It is a fact that the late joiner of the Nazi party (1937) commuted steadily between his first and second fatherlands for a quarter of a century. His Argentine career was a modest one--he was a part owner of a small explosives factory; only on his return to Germany did he move up rapidly, when then Minister for Nuclear Energy Franz Josef Strauss appointed him a division chief in his department. Five years later he was promoted to associate director of the Karlsruhe nuclear research center, where he stayed until his retirement in 1970.

The establishment of the nuclear research center in 1956 was preceded by severe labor pains. Heisenberg, who had assembled the best and most experienced physicists, wanted to attach the reactor to his Max-Planck Institute in Munich. But the circumspect Nobel Prize winner got in the way of the ambitious FRG nuclear planners--among them Nuclear Energy Minister Franz Josef Strauss. "It bothers me," Heisenberg wrote later, "that for the people who are here making the most important decisions, the lines of demarcation between peaceful nuclear technology and nuclear weapons technology were just as indistinct as those between nuclear technology and nuclear basic research."

Why was it that Strauss specifically brought Schnurr from far-off Argentina? "I believe because I had wide experience in accomplishing big things," Schnurr replied to the BBC reporter. "He was a combination of expert and manager," Strauss explained in Bavarian-accented English.

Rather than picking members of the first team, the new nuclear people working for Strauss and Karl Winnacker, then chairman of the Hoechst Farbwerke, picked their own people for the Karlsruhe nuclear research center: for scientific director, Heidelberg physics professor and close friend of Strauss Otto Haxel; for technical director, industrialist Gerhard Ritter and as administrative director, lawyer Rudolf Greifeld. Like Schnurr, none of the three Strauss and Winnacker buddies had much experience in reactor construction upon assuming office. On the other hand, Greifeld's past as a member of the German high command in occupied Paris caused frequent disturbances in the center, and especially among his colleagues in France (excerpt from a Greifeld letter of 3 January 1941: "Lately the Jews are making themselves very comfortable again in Paris").

In his ten years as associate director, Schnurr, the friend of Argentina, weathered a number of scandals. Thus for instance in 1969, then Research Minister Gerhard Stoltenberg was forced to admit in the Bundestag that Schnurr was paid for what was supposed to be his honorific consultantcy to the "German Atom Forum." Schnurr was also involved in the affair concerning the purchase of two expensive cooling devices, even though Karlsruhe had a requirement for only one. Said a former Karlsruhe institute director: "Schnurr had a more South American than a Teutonic attitude--he was generous and unworried. And he saw in Argentina a great opportunity for the German nuclear industry."

Another colleague from the Karlsruhe days reminisced that "Schnurr retained a very definite interest in his host country. During his tenure as associate director he made periodic trips to Argentina--even for his vacations. He was in close touch with Castro Madero (the present chief of the Atomic Energy Commission) and his two predecessors. Because of his extensive contacts, Schnurr played an important part in Atucha-I."

Atucha-I, not far from Buenos Aires, is the first South American nuclear reactor (320 megawatt). It was sold by the FRG, built by Siemens. The year was 1968, and it was the Germans' first nuclear export breakthrough. They were selected even though the Americans had made a lower bid and the German model had not proven itself. The decisive factor was a technological difference of overriding political significance: the U.S. light water reactor required enriched uranium; the Germany heavy water type, natural uranium. The Argentines have masses of the latter in their own country (20,000-40,000 tons); the enriched fuel is available only in the monopolistic United States. In the words of CNEA official J.A. Sabato at the time: "The major disadvantage of the light water model is the fact that at this moment only the United States offers commercial uranium enrichment."

III

One thing has been certain since the 1950's: to the Argentines, whether under a dictatorship or a democracy, national independence in nuclear energy matters was always of greater importance than price or profits (a natural uranium reactor costs about 50 percent more than a light water power plant). With the decision in favor of heavy water (a second reactor was purchased from Canada in 1973) they had mastered the first step of the fuel cycle. Two more steps were necessary which could theoretically lead to bomb production also: a heavy water production plant, a fuel element plant and a reprocessing facility in which pure plutonium, suitable for bomb manufacture, would be separated from the uranium waste products. Whoever is in possession of this chain can produce the substance necessary for the production of bombs. However, having the facilities is no proof of military intentions. Plutonium is a valuable splitting material which can again be reintroduced into the fuel cycle process.

For Buenos Aires such a big spending program is of course less urgent than is the case in other states: Argentina has enormous uranium reserves; its power plants, two of which are still in process of completion, require only natural uranium. As to waste disposal, there is no need for the equivalent of Gorleben. The thinly populated country (eleven times the size of the FRG with one-half the number of inhabitants) can afford to bury the hot waste in the pampas.

Nevertheless the Argentines have for many decades practiced a policy of economic self-sufficiency which is as stubborn as it is deft: it had to be the entire cycle. Fuel production they learned from the Germans early on. The technology of zirconium production (indispensable for fuel rod casings) they bought from the Russians in 1980--exactly when Jimmy Carter used the wheat weapon because of Afghanistan.

The only things missing were the heavy water and reprocessing.

The BBC detectives now come up with something stupefying: a "secret treaty" between Bonn and Buenos Aires, which, among other things, provided for the sale of reprocessing equipment (so-called "hot cells"). Their star witness: Walther Schnurr.

"At the time, I offered the (Argentine Atomic Energy) commission an agreement for cooperation. It is still in force today." The most important point of collaboration concerned nuclear energy, but "other subjects also."

To this day persistent rumors are circulating in Karlsruhe, according to which then Associate Director Schnurr (1960-1970) had been extremely generous. A physicist who has for many years been working at the nuclear research center says: "During the 1960's, Schnurr made the Argentines a present of a reprocessing facility. Nobody outside the Schnurr circle knew anything about this. The story came out when our former colleague Leon Gruenbaum (who had been workin in the 'fast breeder reactor' group) gave an interview to the Belgian newspaper LA WALLONIE some years later. I asked an old associate of Schnurr's whether this was true, and he said yes."

Government spokesman Lothar Ruehl makes a categoric denial: "There is no secret treaty between the FRG and Argentina. Nor has there ever been one." There is however an official "cooperation agreement" dated 28 November 1969 for all to see--published in the FRG legal gazette of 17 January 1970. The text of the agreement is concise: the exchange of scientists and information; joint research projects; the construction and use of scientific and experimental facilities.

Just as concise is the statement of Karlsruhe board member Dr Hans Hennies, erroneously designated "the present director" by BBC reporter Denselow: the Argentines, he said, "had to learn how to handle radioactive fuel, and this was achieved by our providing them knowledge about the production of hot cells, experimental equipment for reprocessing research..." A facility, in fact? "Not a de facto facility; only experimental equipment..."

The experts agree at least that toward the end of the 1960's Argentina built a testing laboratory which continued to function until the early 1970's. At the moment they are constructing a major pilot plant which until now has not been subject to any international controls. Government spokesman Ruehl is correct in emphasizing that today "no German partner is involved in the construction and operation of reprocessing facilities." The need for such a partnership is long past, because in the meantime the Argentines have learned enough to be do-it-yourselfers.

There remains the final step: the production of heavy water, the key element in operating a natural uranium reactor. Ever since Jimmy Carter assembled the worlds' nuclear powers in London at the end of the 1970's in a "suppliers' club" (with the objective of exercising control of weapon-suitable equipment), heavy water and reprocessing facilities have been at the top of the list of "sensitive" export goods.

At that exact moment the Argentines invited bids for a lucrative large contract: for construction of a heavy water factory and a natural uranium power plant with twice the capacity of Atucha-I. The FRG and Canada rushed to Buenos Aires as offerors--to begin with, in great harmony. Both had apparently agreed to demand "full scope safeguards" from the Argentines--shop talk for comprehensive surveillance by the Vienna-based IAEO atomic authority.

"Full scope safeguards" are equivalent to a net which covers the receiving country in its entirety: not only the newly imported materiel, but all nuclear facilities must be made accessible to the inspectors from Vienna. But the Argentines declined to accept this rigorous control as stubbornly as they had refused to sign the nuclear test ban treaty.

In contrast to the Canadians, the Germans finally made concessions. And, writes U.S. South America expert John Redick, "there are some indications that the German representatives misled the Canadians in order to grab the contract--by letting the Canadians think that they too would insist on universal surveillance." In the meantime, a discreet parallel deal with Switzerland got started, which the Argentines regarded as a signal for splitting: they ordered the reactor from the German Kraftwerkunion, the heavy water plant from the Swiss firm Sulzer. This was an elegant way of circumventing the full scope safeguards: the Swiss, not being as meticulous as the Canadians, insisted on international control, but only for their part. Being the providers of the less "sensitive" reactor, the Germans could in good conscience also renounce total control.

In the year 1979 the Argentines had finally reached their objective: they had assembled all the components inside their country which would some day provide them with mastery of the complete nuclear fuel cycle. But it was not only the Germans who had helped them; the list included the Americans, the Russians, Canadians, Englishmen, Frenchmen, Italians and Swiss.

Could they build a bomb? In principle, yes. Are they permitted to build a bomb? In principle, no. IAEO lawyer Reinhard Rainer says that "the 11 safeguard agreements with our authority actually cover every component of the Argentine program." And what about the uncontrolled reprocessing facility? "The surveillance covers this. Should for instance the waste material from Atucha-I get into that facility, the Argentines would have to permit access to our inspectors."

Do the Argentines want to build a bomb?

Walter Seelmann-Eggebert feels that while the Argentines with their "strongly exaggerated nationalism" have very ambitious plans with their nuclear technology, they are still a long ways away from the bomb. In the opinion of that Argentina expert, at least another 10 years would have to pass before Buenos Aires could produce what the charlatan Richter promised to dictator Peron 31 years ago: a primitive atomic bomb.

9273
CSO: 5100/2167

DEPENDENCE ON USSR FOR URANIUM ENRICHMENT NOTED

Bonn VORWAERTS in German 22 Apr 82 p 22

[Article by Nikolaus Piper: "The Utterly Inconspicuous Dependence: About the Slight Difference Between Uranium Deals With the East and Gas Deals"]

> [Text] Going almost unnoticed by the public is the fact that the supply of FRG nuclear power plants with enriched uranium has become dependent on the Soviet Union to a high degree.

The affair is almost a grotesquerie. Franz Josef Strauss, prime minister of the Bavarian Free State, was in the United States on a state visit early in March. During this visit the conversation touched on the natural gas pipeline deal between the Soviet Union and several West European countries, a deal about which the Reagan administration had registered the strongest misgivings.

The BAYERNKURIER was able to report at that time: "Strauss' viewpoint is clear. He would not have signed the agreement because he rejects all economic relations with the Eastern Bloc which make the West dependent for its energy supply."

Shortly before Strauss left for Washington, a member of his cabinet, State Minister Alfred Dick, had to deal with an energy policy "dependence on the Eastern Bloc" of an entirely different nature. On 10 March he replied to a written question by Upper Palatinate FDP Landtag Representative Kurt Sieber:

"Bavarian energy supply enterprises have not bought any uranium in the Soviet Union; /they merely had the uranium enriched in the Soviet Union/." [In italics]

Had Minister Dick been a little more precise, he could have told the representative considerably more: In 1980 the Soviet Union supplied about 40 percent of the weakly enriched uranium in the Federal Republic. This is a degree of dependence which is considerably higher than the degree to which the FRG will be dependent on Soviet natural gas once the natural gas pipeline is built.

Fuel elements processed in the Soviet Union were burned in the Biblis and Neckarwestheim nuclear power plants, at the Grafenrheinfeld in Bavaria and in the Niederaichbach nuclear power plant, which has been shut down in the meantime.

It would also have been interesting, particularly for the Bavarian FDP representative, to know the way in which the fuel elements traveled between the Soviet Union and FRG energy supply enterprises.

Nuclear power plant operators delivered the unprocessed fuel to "Uranservice" [Uranium Service], a Soviet foreign trade firm, and received their enriched material back from it. The Duesseldorf firm which carries out the transfers and is the only party to the contract with "Uranservice" is "Rohstoff-Einfuhr- und Handelsgesellschaft mbH" [Raw Materials Imports and Trade Company, Ltd], owned by the couple Alfred and Renate Hempel.

On the firm's advisory council, besides Carl Zimmerer, managing director of "Interfinanz" and regular guest in conservative discussion circles, there is also Wilhelm Fritz, chairman of the board of Agrippina Insurance. In his second job Fritz is also president of the Bavarian Regional Sports Association and a regular hunting companion of Franz Josef Strauss in the Bavarian mountains.

Jimmy Carter's Misgivings

And, after all, the unusually high level of enriched uranium imports from the USSR is not due to the illusions of detente-hungry social liberals, but instead chiefly to earlier political decisions of the FRG's great ally, the United States.

Until the beginning of the 1970's, the United States was the only supplier of enriched uranium to the FRG and to most of the countries of Western Europe. The technology of uranium enrichment is costly and energy-intensive. And it is militarily sensitive, because in principle it is not very different from the process for producing atom bomb material.

What is involved is the enriching of uranium isotope U 235, which is valuable because it is fissile but which is present in natural uranium at only 0.7 percent, to 3 percent in order to make it possible to burn it in a light water reactor. For an atomic bomb U 235 must be enriched to more than 90 percent.

In 1973, Euratom, the European atomic energy authority, noticed for the first time that the nuclear fuel supply for European nuclear power plants could be jeopardized. The U.S. Atomic Energy Commission, USAEC, let it be known that its capacity was fully taken up and that it could no longer accept new enrichment orders from Europe.

At that time, as remembered today by a negotiator of that time, "the United States made a crucial mistake": it departed from the principle of nondiscrimination. It supplied domestic energy suppliers in preference to foreigners. It proved thereby that, especially for smaller countries, nuclear supply security was not as good as had appeared to that point.

Under these circumstances the Europeans first put their plans for the construction of a uranium enrichment plant into concrete form: the two projects Eurodif and Urenco were started. Simultaneously, and still more importantly, Euratom in its need found a new party to the contract: the Soviet Union. The Soviet Union proved to be an obliging and courteous contract party. It recognized Euratom--for the first time--as an independent organization, and it made delivery under the same conditions as the United States--but at a price averaging 5 percent less.

Thus, as early as 1974, more than 30 percent of the weakly enriched uranium in the FRG came from the USSR. In 1977 the development intensified when the U.S. President at that time, Jimmie Carter, exerted pressure on the enrichment contracts, mainly for fear of proliferation of nuclear weapons, and the Europeans feared they would not receive anything more from the United States. In 1978 and 1979, the Soviets supplied approximately half of the FRG's weakly enriched uranium and ousted the United States from first place among suppliers.

Serious, Obliging Business Partners

The "Economic Association for the Recycling of Nuclear Fuel" at Bonn judges the business practices of the Soviet partner to be "serious, obliging and above all beyond a shadow of a doubt." Supply contracts are secured up to the year 2005.

To be sure, if the criteria of opponents of the natural gas pipeline deal--for instance, Strauss or the U.S. Government--are used, then despite Soviet contractual adherence, this dependence is a threat. If not, however, then a substantial dependence on Soviet natural gas is also no danger.

On the other hand: How secure a supply is there in fact for nuclear energy?

Although the Reagan administration is trying to repress Carter's nuclear misgivings, and to protect its reputation as a reliable partner in the enrichment business, the Carter era showed how rapidly the supply of nuclear fuel can become unpredictable, even when the supplier is in the West.

5586
CSO: 5100/2163

ESMERALDA PROJECT RESEARCH ON SODIUM FIRES REVEALED

Paris LE MONDE in French 14 Apr 82 pp 13,14

[Article by Jean-Francois Augereau: "Esmeralda Program for Breeder Reactor Safety. How to Control Sodium Fires Involving Tens of Tons of Sodium."]

> [Text] Contrary to the vast majority of nuclear power plants, which use water to evacuate the heat produced in the reactor core, breeder reactors, such as the Super-Phenix reactor which the FRG, Italy and France are now building on the Rhone at Creys-Malville (department of Isere), use liquid sodium as a coolant. Whereas this metal, which is a solid at room temperature, has thermal and neutronic characteristics which enable it to satisfy the requirements of breeder reactor constructors, it also has the disadvantage of producing a violent reaction when in presence of water or oxygen.
>
> This peculiarity has been a cause of concern for nuclear energy experts who have been studying these phenomena and the means to control them for already 10 years. Experiments of this kind are routinely carried out at the Nuclear Research Center of Cadarache (department of Bouches-du-Rhone) on amounts of sodium of up to 1 ton. This is still a far cry from the amounts contained in industrial breeder reactors. This is why the Atomic Energy Commission (CEA) is now completing at Cadarache the construction of a number of buildings which will soon be used to study--under the Esmeralda program--the larger fires (70 tons of sodium) which, according to the experts, could result from accidents in breeder reactor plants.

As some 20 antinuclear committees and associations, which left Creys-Malville on 28 March, are marching on Paris where they are expected to arrive on Saturday 17 April to denounce the dangers of breeder reactors, the CEA is opening the doors of its Cadarache Nuclear Research Center to present the state of the art on sodium fire research. Although the CEA denies any intentional planning, the subject chosen is remarkably relevant to offset the statements of nuclear power opponents who wish to draw public attention on the problems connected with the storage, handling and use of large amounts of sodium.

Found all over the earth under different chemical forms, and especially as chloride (sea salt), sodium is the object of a relatively large industry: in France, the Plombieres-Saint-Marcel (department of Savoie) plant of the Pechiney-Ugine-Kuhlmann group produces 13,000 tons of sodium annually. As for the United States, their production amounts to 220,000 tons. In other words, sodium is commonly used. For instance, it is used in the production of titanium and tetraethyl lead--used as an anti-knocking agent in the premium gasoline for internal combustion engines--as well as in numerous synthetic pharmaceutical products.

The nuclear uses of sodium, however, are of more recent origin and almost exclusively the result of breeder reactor development. In order to discharge the power produced in their cores, reactors of this type require a coolant with a relatively high atomic mass so as not to slow down excessively the neutrons, with good neutronic properties so as not to absorb too many neutrons, and with excellent thermal properties in order to evacuate the heat produced by the fuel.

Sodium has all of these properties: it has a satisfactory calorific capacity, an excellent heat conductivity; at 550°C its viscosity is close to that of water at 20°C; and it can be used over a wide range of temperatures since it boils only at 651°C. All these characteristics make it possible for the breeder reactors to operate under low pressure, contrary to the traditional nuclear power plants.

The Chevtchenko Accident

These advantages are offset by an unfortunate characteristic which is the result of sodium chemistry itself. According to the director of the Nuclear Safety and Protection Institute, Mr Pierre Tanguy, "whereas, under normal conditions, sodium is perfectly compatible with the materials with which it normally comes into contact, the risks of accidental contact of sodium with water and air must be taken into consideration in the safety studies" (of reactors).

In fact, at room temperature sodium combines spontaneously with water. It then releases hydrogen which reacts with atmospheric oxygen and can either burn or explode.* Now, water is present everywhere in steam generators where heat exchanges take place between the sodium of the plant secondary circuit and the water which, as steam, will power the turbo-alternators (see insert). Therefore, a defective weld, a pipe failure are enough to trigger the reaction. This phenomenon is in no way unlikely. It has already occurred, as witnessed by the accident which, in 1974, caused severe damages to one of the buildings of the Chevtchenko breeder reactor power plant built by the Soviets on the shore of the Caspian Sea.

Therefore, to remedy such accidents, and prevent them from turning into disasters the steam generators of breeder reactors such as the Phenix and

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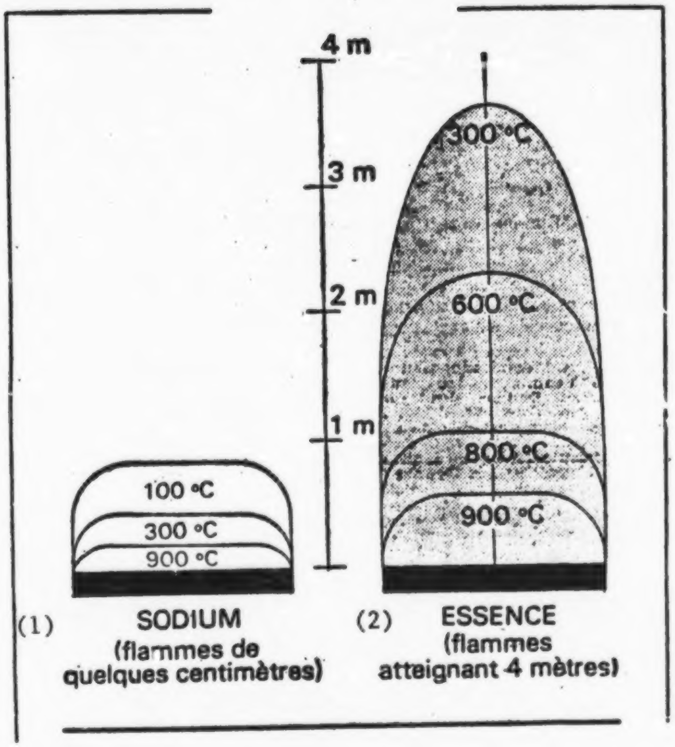
* A reaction of this type also occurs when sodium and concrete come into contact. This can be prevented by covering the ground with metal.



4 m
3 m
2 m
1 m
100 °C
300 °C
900 °C
300 °C
600 °C
800 °C
900 °C
(1)
SODIUM
(flammes de quelques centimètres)
(2)
ESSENCE
(flammes atteignant 4 mètres)

Key:
1. Sodium (height of flames: a few centimeters)
2. Gasoline (height of flames: up to 4 meters)

Characteristics of Fire	Sodium	Gasoline
Rate of combustion	35 kg/m^2/h	120 kg/m^2/h
Heat of combustion (calorific power).	10,000 kJ/kg	44,000 kJ/kg
Flames	little flame	several meters high
Temperature 80 cm from surface . .	less than 100°C	800°C
Quantity of air consumed	1 m^3/kg	10 m^3/kg

The above chart and table show the essential differences between a sodium fire and an oil-product fire. The main differences are in the height of the flames --a few centimeters for sodium fires compared with a few meters for oil-product fires--and in the temperature diagram, the temperatures near a sodium fire being relatively low.

Super-Phenix, are provided with several safety systems: ultra-sensitive hydrogen detectors, drainage systems, quick-lock shut-off valves, flexible membrane devices to evacuate the hydrogen produced, etc.

Sodium will also readily react with hydrogen. At room temperature, its oxidation occurs slowly; however, as soon as the temperature rises, it can turn into combustion and eventually result in a sodium fire, either as a sheet of fire when sodium is merely flowing, or as a sprayed sodium fire when sodium is projected under pressure into the atmosphere, or again as mixed fires combining these two phenomena, the latter being a frequent risk in the case of sodium contained in the reactor secondary circuit.

According to Mr Jean-Claude Malet, head of the Sodium Fire Section at the CEA, "it would take a core fusion accident to release enough energy to cause a leak in the barrier formed by the reactor main vessel" which contains most of the 3,100 tons of sodium of the primary circuit. "The amount of primary sodium which might leak out of the reactor vessel would do so under high pressure, through small-section cracks, and the result would be a spray fire which would propagate itself inside the dome. (...) To remedy accidents of this type, we would allow the fire to spread in this enclosure which would form a third barrier for the contaminated products escaping from the core, a fourth barrier being provided by the reactor building."*

Tens of Tons

According to him, these successive enclosures confine the main risk to the secondary sodium circuit. If a small leak occurs, or if a large-section pipe is crushed ("guillotine" effect), amounts of sodium ranging from tens of kilograms to tens of tons are immediately released. However, since the pressure in the pipes is low, it can be assumed that the resulting fires would, in that case, be sodium sheet fires.

As early as 1972, the CEA started a program of theoretical and applied studies on sodium-water reactions and sodium fires. These studies took place at the Cadarache Nuclear Research Center; they have made it possible to develop a series of measures to control sodium-water reactions, to acquire a better knowledge of the combustion mechanisms of sheet fires, and to perfect fire-fighting devices such as extinguisher tanks and extinguishing powders.

The task, however, has not been easy. Considered from a certain angle, sodium fires have encouraging characteristics--the reaction releases relatively little heat, the fire does not propagate at high speed as when oil products are burning, the flame is short (a few centimeters) and, in spite of the flames, the sodium temperature remains moderate and well below its boiling point; nevertheless, serious difficulties are encountered when trying to extinguish them. The reason is that, at the temperatures involved, "few substances are inert toward sodium."

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* LA RECHERCHE, October 1978

In addition, it is not enough to extinguish a sodium fire; the extinction must be durable, i.e. the product used--a powder--must remain active until the sodium temperature is well below its minimum fire point (approximately 140°C). In spite of that, at the CEA and at the Orleans research center of CNRS [National Center for Scientific Research], teams of researchers on combustion and high-temperature chemistry have developed a powder which has given excellent results both with sodium fires and with heavy oil and electric cable fires.

This substance consists of a sodium carbonate hydrate, lithium carbonate and graphite; it somehow smothers the fire by separating the sodium from the oxygen with which it would react. It has the additional advantage of clinging to walls onto which it can be sprayed, and above all of ending immediately the production of very dense and opaque white smoke released by sodium fires and against which fire-fighters must protect themselves.

At Cadarache, CEA research teams routinely extinguish one-ton sodium fires. Two hundred kilograms of Marcalina powder are enough to control such an accident at first.

However, the results of these successful experiments cannot be directly extrapolated to larger fires. Although the experts do not think it could occur, they will not rule out the possibility of a sudden rupture of a large-diameter pipe which, in a breeder reactor, could trigger a fire involving up to 70 tons of sodium. This is the reason for the Esmeralda project which is financed by France* (62 million francs) and Italy (31.7 million francs).

This reasearch program--the only of its kind in the world--involves setting tens of tons of sodium on fire and then controlling the fire in order to check the validity of the calculation codes developed with respect to the formation and dispersion of the aerosols resulting from fires, and the performance of the filters installed to intercept them, as well as to test the efficiency of the fire-fighting devices which could be used in fast-neutron reactors, of which Super-Phenix is the first industrial prototype.

Thanks to the Esmeralda facilities at Cadarache, the CEA research teams will be able to study in actual size, in a large 3,600 cubic meter vessel, the effects of sodium fires on the larger components of Super-Phenix (fuel element storage cylinder for instance), and to simulate, in a 20-meter high tower, (half-scale) accidents resulting from sodium-water reactions in steam generators. By September, everything should be ready for the first experiment, involving a one-ton fire. The amounts of sodium used will be increased progressively; the third experiment, in 1983, will involve some 20 tons of sodium distributed over a 30 square meter area. Approximately 10 experiments will take place each year; cost : 52 million francs over 4 years. Some fireworks!

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* At June 1979 prices. Ten percent of the French contribution will be financed by EDF [French Electric Company] and 5 percent by NERSA [expansion unknown] in which the interests of EDF and other European electric companies are represented; the remainder will be financed by the CEA.

Primary and Secondary Circuits

In a fast-neutron reactor, or breeder reactor, the reactor core is immersed in sodium which, through the primary circuit, evacuates the heat produced by the nuclear fuel. In an intermediate exchanger, the primary sodium--which becomes radioactive since it is in contact with the reactor core--transfers its calories to a secondary sodium circuit which is radiologically totally inactive. In turn, the secondary sodium heats water in a steam generator which, as its name indicates, produces the hot steam that will power the turbines and alternators supplying electricity to the network.

In the Super-Phenix reactor there are 3,300 tons of sodium in the primary circuit, 1,500 tons in the loops of the secondary circuit, and another 800 tons in the fuel-element storage cylinder and miscellaneous auxiliary circuits.

9294
CSO:5100/2159

LEGISLATION ON REORGANIZATION, NAME CHANGE OF CNEN

Rome STAFFETTA QUOTIDIANA PETROLIFERA in Italian 26 Mar 82 pp 4-6

[Offprint: "Law Instituting the ENEA (formerly CNEN)"; published in the GAZZETTA UFFICIALE No 79, 22 March 1982]

[Text] Law of 5 March 1982, No 84

Modification and integration of the law of 15 December 1971, No 1240, concerning the restructuring of the National Committee for Nuclear Energy.

The Chamber of Deputies and Senate of the Republic have approved and the president promulgates the following law:

Article 1

The National Committee for Nuclear Energy, instituted by the law of 11 August 1960, No 933, and modified by the law of 15 December 1971, No 1240, assumes the title of "National Committee for Research and Development of Nuclear Energy and Alternative Energy Sources (ENEA)" and is exempt from application of the law of 20 March 1975, No 70.

In all laws and regulations in force, the words "National Committee for Nuclear Energy (CNEN)" are replaced by the words "National Committee for Research and Development of Nuclear Energy and Alternative Energy Sources (ENEA)."

For the purposes of the present law, alternative energy is that recovered from sources other than hydrocarbons.

Article 2

Article 2 of the law of 15 December 1971, No 1240, is replaced by the following:

Article 2: Within the framework of the national policy on energy, the ENEA is charged with promoting the development and qualification of national industry regarding health and the environment.

For these purposes, the ENEA:

(1) in collaboration with the other entities affected, shall implement and promote the study, development and demonstrations pertinent to the energy technology under its jurisdiction and to energy conservation in the various phases of production, transportation and utilization, including the disposal of waste products from related processes;

(2) shall implement, promote and coordinate studies, research and experimentation on the ways in which the development and use of energy sources affect the environment and the health of workers and the population; and on the safety of energy-producing plants, including the safety of nuclear plants and protection from ionizing radiation;

(3) shall provide for transmitting acquired knowledge and the results of research and experience to industrial operators in collaborating with them on planning and building prototypes of components and plants;

(4) shall collaborate in scientific, technological and industrial areas with international and foreign entities operating in sectors under its jurisdiction both within the framework of international agreements and on the basis of directives from the ministry of Industry and Commerce and the ministry of Foreign Affairs with information to the ministry for coordinating initiatives in scientific and technological research;

(5) shall issue the regulations and exercise the supervision relevant to nuclear safety and to protecting the health of the workers and population against the danger of ionizing radiation; it shall account for special fissionable materials, raw materials and minerals; it shall verify the application of passive physical measures for the protection of nuclear plants and nuclear materials; and it shall implement international agreements on safeguarding special fissionable materials, raw materials and minerals;

(6) shall promote and support the training of personnel in the field of energy technology;

(7) shall publish and disseminate information on energy problems;

(8) shall give opinions, counsel and technical instruction to the administrative bodies of the nation, regions and local governments on problems connected with the production and utilization of energy. The ENEA is subject to article 107 of the decree of the president of the Republic of 24 July 1977, No 616.

To fulfill the charge under numbers (1), (2), (3) and (4) of the present article, the ENEA:

(a) may make contracts with the regions and local governments;

(b) on the basis of appropriate contracts may entrust to universities, institutes of research and experimentation, other entities and companies the performance of studies, research and experiments in order to carry out its scientific program;

(c) may make collaborative contracts with national industries and may make available to them its expertise, information, patents and other assets;

(d) may promote the formation of industrial consortiums made up of private, international or foreign corporations whose purpose is the industrial development of energy technology, and may participate in them in the framework of programs approved by the CIPE [Interministerial Committee for Economic Planning] and with the authorization of the minister of Industry and Commerce, who shall give prior notification to parliament.

Majority participation is permitted with companies whose purpose is research, cevelopment and demonstration in technological sectors under ENEA jurisdiction.

In the case of companies having production and commercial purposes related to the development of nuclear and alternative energy sources (excluding activities reserved to the ENEL by the law of 6 December 1962, No 1643 and subsequent modifications), the ENEA may have only a minority share of participation. In this case, participation quotas in national companies must be represented by patents awarded, information, equipment, plants or infrastructures as well as by expertise.

Article 3

Article 3 of the law of 15 December 1971, No 1240, is replaced by the following:

Article 3: At the ENEA's proposal, the minister of Industry and Commerce shall present the 5-year plan of operations to the CIPE in compliance with its regulations and for its approval, with provisions for financing for the entire period.

Three months before the end of the 5-year period, the minister of Industry and Commerce, on motion by the board of directors of the CIPE, shall present to parliament the plan for the subsequent 5-year period.

In the three months following the CIPE's approval of the 5-year plan, the minister of Industry and Commerce shall present to parliament a bill to allocate necessary financing to the ENEA within the limits of the resources of the state's annual and multi-year budgets; the minister shall also submit a detailed report to parliament on the program and the results achieved in the preceding 5-year period.

Every October, the minister of Industry and Commerce shall submit to parliament a progress report on the program.

The program is, of course, subject to revision, but these procedures shall apply nonetheless.

Article 4

Article 6 of the law of 15 December 1971, No 1240, letter (e) is replace by the following:

(e) shall submit to the minister of Industry and Commerce the prospective budget and statement of accounts payable and, by every 30 April, shall submit a report on the Committee's activity of the preceding year; the report shall be approved by the board of directors.

Article 5

Article 7 of the law of 15 December 1971, No 1240, is modified as follows:

In the first paragraph, No (2), the word "nuclear" is replaced by "energy";

The 4th paragraph is replaced by the following:

The board of directors:

(a) shall formulate the Committee's regulations;

(b) shall supervise the implementation of directives from the CIPE and the minister of Industry and Commerce and, on the basis of these directives, shall formulate the Committe's multi-year program of activity and its possible annual revisions;

(c) shall formulate the budget 2 months prior to the beginning of each fiscal year and shall note possible variances and draw up the statement of expenditures within 4 months of the close of the fiscal year, supporting these statements with the report of results achieved and the progress of operations;

(d) shall consider the allocation of funds not directed to other agencies and offices;

(e) shall consider the business described in letters (a), (b) and (c) of article 2, 3rd paragraph;

(f) shall elect the members of the executive board;

(g) shall approve the regulations and contracts affecting employees' legal and salary status;

(h) shall consider the hiring and training of personnel and the appointment of directors, and the awarding of consulting contracts;

(i) shall consider nominees to the executive board or chairmanship, matters of employee contracts subject to decisions made by the board of directors on the various categories, and shall consider the entity's operating organization within the framework of the general directives issued by the board of directors;

(l) [no (j) or (k)] under the necessary limitations and to the exclusion of matters under (a), (b) and (c) of article 2, shall consider possible delegations of authority to the executive board, chairman, general director or directors of operating units as concerns the allocation of funds, the announcement and judging of competitive bidding, making contracts and placing supply orders;

(m) under the necessary limitations of expense shall consider any delegations of authority to the chairman concerning the assignment of particular study and research projects of a technical, scientific, economic or legal nature to outside contractors having special qualifications.

The 7th, 8th and 9th paragraphs are replaced by the following:

Within the limits of the present law, the board of directors has full management powers and responsibility for the ENEA commensurate with the purposes set forth in articles 1 and 2 of the present law.

The decisions of the ENEA are not subject to approval by the oversight authority.

Decisions under (b) in the preceding fourth paragraph relating to multi-year planning by the ENEA and to possible annual revisions shall be transmitted to the minister of Industry and Commerce, who shall submit them to the CIPE for decision under preceding article 3.

Decisions under (c) and (g) of the preceding fourth paragraph shall be submitted for approval to the minister of Industry and Commerce with notification to the minister of the Treasury within 60 days of receipt of decisions made under (c) and (g) of the preceding fourth paragraph; he shall approve them or return them with explanations for reconsideration by the board of directors. After 60 days, decisions not returned shall become effective.

The quorum of the board of directors is a majority of its membership. On a tie vote, the chairman shall have the casting vote. Votes shall be valid only with two-thirds of the membership present, including the chairman or his substitute.

Article 6

Article 10 of the law of 15 December 1971, No 1240, is replaced by the following:

Article 10: The president of the college of auditors and the auditors shall be appointed by decree of the minister of Industry and Commerce. The college shall have a term of office of five years and be composed of three acting and three alternate members, which shall include an acting auditor who shall function as chairman and an alternate designated by the Treasury minister.

The college shall provide for verifying acts of management, ensure that the bookkeeping is done properly and audit accounts.

It shall write a financial report, report periodically to the minister of Industry and Commerce, and may attend meetings of the board of directors. The chairman of the college of auditors or a member designated by him may attend meetings of the executive board.

The college of auditors shall also exercise its functions during the period of formation of the commission.

Article 7

The second paragraph of article 20 of the law of 15 December 1971, No 1240, is replaced by the following:

The ENEA's board of directors shall establish in advance criteria for determining compensation for performing tests, analyses, verifications and certifications requested by private parties or suggested by public entities and shall similarly establish critera for making expenditures for the ENEA's own purposes, as provided by the law of 31 December 1962, No 1860, and by the decree of the president of the Republic of 13 February 1964, No 185.

Decisions made under the preceding paragraph are subject to approval as provided in the 8th paragraph of article 7.

Article 8

The legal and economic status of ENEA employees shall be established by a collective labor contract of three years duration that shall be concluded with the national union organizations having majority representation. Until the first collective contract goes into effect, employee labor relations shall be regulated on the basis of the law of 20 March 1975, No 70.

Participation in contract negotiations shall include ENEA and union delegations, and observers from the ministry of Industry and Commerce, the ministry of the Treasury, and the ministry for Scientific Research.

The work of ENEA employees is incompatible with any other private or public employment and the exercise of any other profession or trade.

Employees shall not hold positions as administrative advisors, liquidators, union officials or officials in a company or entity of any nature except as deemed necessary to the interests of the ENEA by the board of directors subject to the approval of the ministry of Industry and Commerce.

Article 9

ENEA personnel may, with their consent, be assigned to duty in public administrative bodies; Italian or foreign universities; international and community organizations; national, international or foreign centers, institutes or laboratories, research organizations or units of industrial corporations, upon reqest.

The present law with the seal of state affixed shall be inserted in the official register of the laws and decrees of the Italian Republic. It is the duty of all to observe it and have it observed as the law of the state.

Rome, 5 March 1982

[Signed] Pertini

[Signed] Spadolini, Marcora, La Malfa, Andreatta, Tesini

Seal: Darida

8782
CSO: 3104/166

END

JPRS 81047

15 June 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 148

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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15 June 1982

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 148

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AUSTRALIA

QUEENSLAND WANTS STATE CONTROL OF NUCLEAR INDUSTRY

Brisbane THE COURIER-MAIL in English 6 Apr 82 p 12

[Article by Peter Morley]

[Text] **State Cabinet made it clear yesterday that it would fight to control the regulation, licensing and development of any nuclear industry in Queensland.**

In a blunt warning to the Federal Government, the Premier, Mr Bjelke-Petersen, said: "Canberra should not attempt to establish machinery to stop the state exercising constitutional rights."

Cabinet took this stand when it considered proposed amendments to the Federal Government's Atomic Energy Act.

Ministers adopted an "initial view" which will put the Queensland position at a special meeting of federal and state representatives later this month.

Mr Bjelke-Petersen said the present Act did not provide an appropriate basis for the nuclear industry's development and effective control would require new legislation.

"While recognising Canberra's international responsibilities in this general area, the state must play the major role within its own boundaries," he said.

"Queensland is prepared to implement appropriate state legislation, complemented by Commonwealth legislation where necessary, to ensure Australia's international obligations are fully honored.

"However, any expansion of Commonwealth jurisdiction into state areas of decision-making will not be acceptable to the Queensland Government.

"Decisions on the development or siting of a uranium enrichment facility or nuclear power plants must remain the responsibility of the state."

CSO: 5100/7529

ANTI-NUCLEAR FORCES HOLD LARGE RALLY IN BRISBANE

Brisbane THE COURIER-MAIL in English 8 Apr 82 p 3

[Article by Karl Condon]

[Text] A crowd estimated at up to 5000 marched peacefully through Brisbane's city centre last night, protesting against the nuclear arms race.

The Rally for Peace, was one of the biggest gatherings ever seen in King George Square.

Among the protesting ranks were members of the Communist Party, unionists, Quakers, and Labor federal and state Members of Parliament.

There were children carrying the Children for Peace banner, protesters wearing gas masks and black or silver suits bush bands and even a few dogs.

Apart from escort duty, there were only a handful of police to be seen.

There were no arrests or injuries.

The "peace walk" began from King George Square after an hour-long rally and ended in the Roma Street forum.

Led by 38 cyclists making a world ride for a nuclear-free future, it moved along Adelaide, George, Elizabeth, Creek, Ann and Roma streets.

In the square the rally was addressed by a range of speakers.

There was historian Professor Manning Clark, Federal Deputy Opposition Leader Mr Bowen, former German Maj. Gen. Gert Bastian and actress Ms Rebecca Gilling.

Maj.-Gen. Bastian resigned from the German army two years ago in protest against his government's decision to deploy nuclear Cruise missiles in Germany.

Mr Bowen told the crowd that there were 40,000 nuclear weapons in the world that could destroy millions of people.

He said throughout the world people were holding peace rallies and in the United States President Reagan was becoming worried.

"The most important thing we can do is remove Ronald Reagan and his ilk," Mr Bowen said. "They have no consideration for humanity or people who have to survive the future.

"Half the world has no education yet spending on war is $1 million a minute."

He said that if only a fraction of this spending went to improve people's standards of living, the money that provided one tank would give 2000 classrooms and one rifle would be $800 to help peasants live.

This surely was more important than building weapons to kill and maim.

Mr Bowen said Australia had a government that thought whatever Mr Reagan did was all right. It was servile and supine.

He criticised sending an Australian force to the Sinai, saying it was ridiculous to suggest it was keeping the peace.

"The solution is for Reagan and Brezhnev to meet and remove all nuclear weapons under their control," Mr Bowen said.

"It can be done and it is the only logical solution."

In Sydney the Federal Opposition deputy Whip, Senator McIntosh, will fly to Tahiti today "to ensure respect for the rights of the crew of the anti-nuclear yacht, Pacific Peacemaker, by the French authorities."

The crew of the yacht allege it was rammed by the French police boat La Bataille last Friday morning about 1 km off Mururoa Atoll while attempting to deliver a message to the French commander of the island.

The yacht was then towed out to sea for about two hours and it has been making its way to Papeete under half power since then, followed by the La Bataille.

Many sponsors of the boat, including the Australian Council of Trade Unions' president, Mr Cliff Dolan, have registered their protest over the incident to the French Government.

CSO: 5100/7529

AUSTRALIA

FRENCH SEIZE 'PEACE VESSEL' IN TAHITI; PROTESTS MOUNT

Canberra THE WEEKEND AUSTRALIAN in English 10-11 Apr 82 p 1

[Article by Nicholas Rothwell]

[Text] **FRENCH police in Tahiti yesterday impounded the Australian anti-nuclear protest yacht Pacific Peacemaker, seized film of the boat being rammed by French naval vessels and laid civil charges against the crew for illegal entry into French waters off the Mururoa Atoll nuclear test site.**

The Peacemaker, captained by Mr Bill Ethell of Perth, was joined at first light yesterday by West Australian senator Gordon McIntosh, who flew to Tahiti to ensure "proper treatment" by the French authorities of the crew.

The damaged yacht entered the harbor of Papeete, the capital of French Polynesia, at nine in the morning and hove-to off the main customs house, where ship and crew were immediately subjected to a "rigorous but courteous" examination by police and customs officials.

Mr Ethell told *The Australian,* via telephone link to Papeete harbor, that French civilian officials had already admitted the Peacemaker had been rammed by the French military vessel Tapatai off Mururoa last week.

Officials of the French civilian Government which administers the territory have told Mr Ethell the vessel, which is still seaworthy despite being rammed at full tilt, will be detained in Papeete harbor until the case on the breaching of the 12-mile limit has been heard.

Another civil action will be heard by the District Attorney's office to determine responsibility for the damage — estimated at $15,000 in repair costs — sustained by the Peacemaker during the collision.

Protests over the ramming of the vessel have been made by the ACTU, the Australian Council of Churches, the Pacific Council of Churches and the World Council of Churches.

CSO: 5100/7529

AUSTRALIA

NORTHERN TERRITORY OFFICIALS URGE URANIUM EXPANSION

Canberra THE AUSTRALIAN in English 7 Apr 82 p 21

[Article by Nicholas Rothwell]

[Text] AUSTRALIA'S uranium exploration and production must be boosted at once if this country is to take full advantage of a long-term expansion in world demand for the nuclear fuel, a senior Northern Territory Government team said from London last night.

The Territory, which controls the lion's share of Australia's high-grade uranium reserves, has assumed new importance on the international market with the release this week of the Organisation for Economic Co-operation and Development's "Red Book", an authoritative survey of the uranium market.

The survey, released every two years by the OECD's Nuclear Energy Agency, agrees with most market studies of the nuclear industry in predicting slack demand until the end of this decade, but then forecasts a rapid increase in demand.

The Territory's Minister for Mines and Energy, Mr Tuxworth, and the Secretary of the Territory Department of Mines, Mr Mike Purcell, are at the start of a two-week trip through Europe to meet uranium customers, energy utilities and nuclear power station manufacturers.

Mr Tuxworth said the OECD report had confirmed the need for Australia to develop its uranium resources and warned that "substantial new resources" would need to be identified to meet the expected demand.

There has been lengthy controversy over the Territory Government's support for uranium mining and the Federal Government's approval for giant mine projects on Aboriginal land in the uranium-rich Arnhem Land province, where the giant Jabiluka deposit, to be developed by Pancontinental, has just been given the go-ahead.

The special European tour by Mr Tuxworth includes an inspection of potential uranium markets, and high-level talks on the possibilities for development of the Territory's reserves are planned with British and other European officials.

"The chances for Australia to win an increased market share are excellent, but with the projected recovery in demand ahead, we must lay more stress on selling our uranium to the Europeans," Mr Tuxworth warned.

Mr Tuxworth also pointed out that Australia should be actively competing with South Africa.

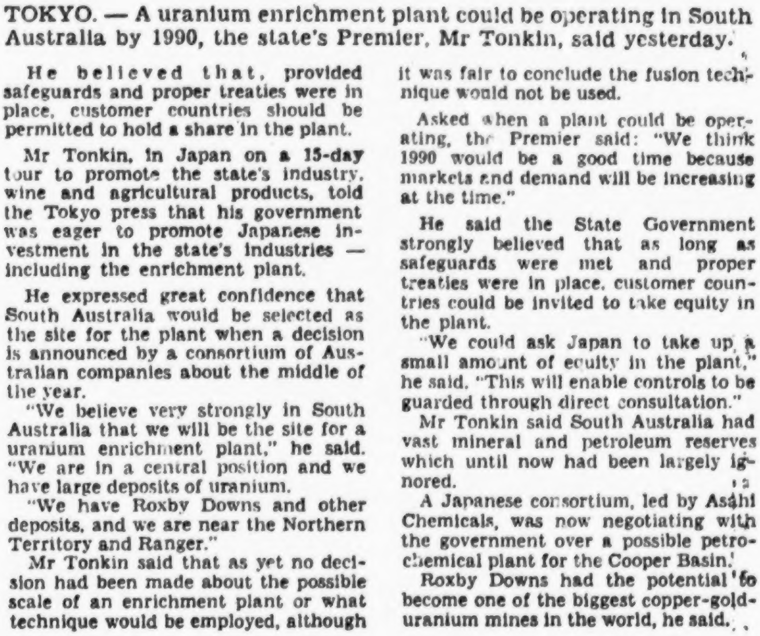
CSO: 5100/7529

TONKIN PREDICTS URANIUM ENRICHMENT PLANT FOR SA BY 1990

Brisbane THE COURIER-MAIL in English 15 Apr 82 p 26

[Article by Ken Merrigan]

[Text]



TOKYO. — A uranium enrichment plant could be operating in South Australia by 1990, the state's Premier, Mr Tonkin, said yesterday.

He believed that, provided safeguards and proper treaties were in place, customer countries should be permitted to hold a share in the plant.

Mr Tonkin, in Japan on a 15-day tour to promote the state's industry, wine and agricultural products, told the Tokyo press that his government was eager to promote Japanese investment in the state's industries — including the enrichment plant.

He expressed great confidence that South Australia would be selected as the site for the plant when a decision is announced by a consortium of Australian companies about the middle of the year.

"We believe very strongly in South Australia that we will be the site for a uranium enrichment plant," he said. "We are in a central position and we have large deposits of uranium.

"We have Roxby Downs and other deposits, and we are near the Northern Territory and Ranger."

Mr Tonkin said that as yet no decision had been made about the possible scale of an enrichment plant or what technique would be employed, although it was fair to conclude the fusion technique would not be used.

Asked when a plant could be operating, the Premier said: "We think 1990 would be a good time because markets and demand will be increasing at the time."

He said the State Government strongly believed that as long as safeguards were met and proper treaties were in place, customer countries could be invited to take equity in the plant.

"We could ask Japan to take up a small amount of equity in the plant," he said. "This will enable controls to be guarded through direct consultation."

Mr Tonkin said South Australia had vast mineral and petroleum reserves which until now had been largely ignored.

A Japanese consortium, led by Asahi Chemicals, was now negotiating with the government over a possible petrochemical plant for the Cooper Basin.

Roxby Downs had the potential to become one of the biggest copper-gold-uranium mines in the world, he said.

CSO: 5100/7529

SA UNION BREAK WITH URANIUM POLICY BOOSTS ROXBY CHANCES

Canberra THE AUSTRALIAN in English 19 Apr 82 p 3

[Article by Alex Greig]

[Text] A shock policy shift on nuclear development by the Australian Workers Union in South Australia has strongly bolstered the chances of large-scale uranium mining at Roxby Downs.

The shift, decided earlier this month by the AWU executive and kept under wraps until it was leaked at the weekend, is the first major crack in the united stance by the State ALP and affiliated unions opposing uranium mining.

The policy reversal brings the State AWU branch in line with federal AWU policy and provides union support for workers employed on the giant mineral resource find at Roxby Downs, in South Australia's far north.

The resource contains one of Australia's largest deposits of copper, gold and uranium. It is being developed as a joint venture between the Western Mining Corporation and BP.

The State ALP Opposition has vowed to oppose uranium mining at the site and has indicated it will oppose the Indenture Bill covering development of the site by the joint venture partners if uranium mining is sanctioned in the agreement.

For their part, the partners and the South Australian Tonkin Government have insisted that the project's viability depends on uranium mining at the site.

South Australia's Opposition Leader, Mr John Bannon, said at the weekend he was disappointed by the AWU move, claiming it had "complicated an already murky issue".

"The only complication I see is that the ALP will seem to have been compromised by this act of the AWU in the public's mind," Mr Bannon said.

But the acting South Australian president of the AWU, Mr John Dunnery, defended his union's move.

"We can't turn out backs on members just because of the place where they happen to be working," he said.

"Our people are already at Roxby Downs working under the Federal Services Prospecting Award and we have to recognise that fact.

"We have to accept there are workers already mining and processing uranium in the Northern Territory under the Miscellaneous Workers Union.

"Mr Dolan of the ACTU has been up to tell them they shouldn't be working, but they are still there.

"It's a problem, but where is Mr Dolan going to find alternative jobs for our members that pay $600 a week?

"We might ask where Mr Dolan is going to find them other jobs at all.

"While we have members who want to work at Roxby Downs, we'll be looking after their interests," Mr Dunnery said.

Meanwhile, Acting Premier and Minister for Mines and Energy, Mr Goldsworthy, welcomed the AWU switch.

"I am pleased the branch has fallen into line with federal policy. It seems this is another indication in the union movement of firmness of support for uranium development," he said.

CSO: 5100/7530

LABOR PARTY STICKING TO 'REPUDIATION' POLICY ON URANIUM

Sydney THE SYDNEY MORNING HERALD in English 16 Apr 82 p 3

[Article by Paul Kelly, political correspondent]

[Text] The Labor Party is expected to endorse its present policy on uranium mining — which involves the repudiation of committments by the present Government — at the ALP national conference next July.

A meeting of the committee to finalise the resources platform was held in Sydney last Wednesday at which both senior figures from the Right and Left-wing decided to endorse the existing policy.

But the ALP national executive will examine at its next meeting on May 7 a legal opinion on the extent to which implementation of Labor's uranium platform could lead to huge compensation claims being made against a future Labor government by uranium companies.

This week's meeting considered a draft platform from the ALP spokesman on resources, Mr Paul Keating (NSW), whose key features were an expanded role for the AIDC in raising capital and holding equity in mining ventures and sticking with the controversial uranium policy.

This means that uranium is certain to be a major issue at the 1983 general election — simply because it will polarise both Government and Opposition.

Existing ALP policy says a future Labor government will "repudiate any committment of a non-Labor government" involving the mining or export of uranium under agreements contrary to Labor policy.

The ALP insists that uranium development can not take place until safeguards and waste-disposal problems have been solved.

This policy originated from the ALP Left-wing at the Perth, 1977, national conference.

The Labor Leader, Mr Hayden, has been instrumental in seeking a legal opinion on the extent to which it could damage a future Labor government due to compensation claims from uranium companies.

The Shadow Attorney-General, Senator Evans, will be providing the legal opinion to the next meeting of the ALP national executive.

Meanwhile, Left-wing figures in the party have obtained their own legal opinion from a Sydney barrister, Mr M. McHugh, and are confident that the existing uranium policy will prevail.

The major opposition to the current policy comes from the Labor Party in the Northern Territory, Western Australia and South Austalia where there are fears that it could be electorally counter-productive.

But the Left wing agues that the policy is a political plus and assists the Labor Party in securing the preferences of the Australian Democrats.

CSO: 5100/7530

BRIEFS

RADIOACTIVITY IN MILK--Milk supplies are still showing signs of radioactive contamination even though France last exploded an atomic bomb in the atmosphere more than five years ago. Traces of contamination were revealed in milk from Capel, in the south-west of Western Australia, after tests by the Australian Radiation Laboratory in Melbourne. The tests were conducted to find whether any member of the uranium or thorium series of radioactive substances were present in the Capel milk, following anxiety about the use of monazite tailings as land fill in the area. Although no traces of these substances were detected, caesium 137--a fall-out product resulting from the French atomic tests on Mururoa Atoll during the mid-1960s and 1970s--was found. [Text] [Canberra THE WEEKEND AUSTRALIAN in English 10-11 Apr 82 p 3]

CSO: 5100/7530

MINISTER REPORTS HEAVY WATER OUTPUT ADEQUATE

Bombay THE TIMES OF INDIA in English 7 May 82 p 5

[Excerpt]

NEW DELHI, May 6 (UNI).

THE opposition charged the minister of state for science and technology, Mr. C. P. N. Singh, with "hiding something" when he said whether heavy water had to be imported for the reactor, R-5, could be decided only at the time of its completion in 1983-84.

Mr. Singh said he was not hiding anything. Production of heavy water was being taken up in a phased manner. Heavy water requirement was at present being looked after by the Baroda and Tuticorin plants. Kota and Talcher plants would also be commissioned to meet the gap in supply.

The heavy water requirement for the initial charge of R-5 would be 90 tonnes and operational loss was estimated at three tonnes.

The R-5 was an experimental plant with a 100 Mw capacity. There was no shortage of heavy water for it.

Mr. Jaswant Singh, Mr. A. Kulkarni, Mr. Shahabuddin, Mr. H. S. Bhabnra, Mr. V. Gopalasamy and Mr. P. Ramamurti, persistently asked about indigenous production of heavy water and how the government would meet the demand.

Mr. Singh said the question did not relate to heavy water production for which he did not have figures immediately.

The chairman, Mr. M. Hidayatullah, said the questioner should have sought specific details about heavy water.

The members' worry was since the U.S. and Canada had refused to supply heavy water, from where could the government get it.

In his main answer to Mr. Jaswant Singh, Mr. C. P. N. Singh said the construction of R-5 was likely to be completed during 1983-84.

Mr. Singh told Mr. Jaswant Singh that plutonium 239 was a byproduct which "we are not manufacturing."

He said at present there was no need to import heavy water. As and when necessary, the government would take steps for imports.

The occurrence of a minor mishap in the zirconium sponge plant of the Hyderabad nuclear fuel complex was confirmed by the minister of state for science and technology, Mr. C. P. N. Singh, in a written reply.

There was no injury to anybody or damage to any equipment, he said.

In another answer, the minister denied that "the recognised union" of employees of Rajasthan atomic power plant had made any complaint of high radiation exposure in the plant.

CSO: 5100/7094

BRIEFS

DEFENSE EXPERT ON NONPROLIFERATION PACT--NEW DELHI, May 8 (UNI)--The 80 developing countries, which are signatories to the Non-Proliferation Treaty (NPT), should withdraw from it unless the nuclear powers reduce their nuclear arsenal by half within one year, says an Indian defence expert. The threat to repudiate the treaty "would powerfully strengthen" the popular peace movements in the industrialised world, according to Mr. K. Subrahmanayam, director of the Institute for Defence Studies and Analyses. In a study released recently, Mr. Subrahmanayam says that the developing countries should put forth this demand during the U.N. special session on disarmament to be held in June. Mr. Subrahmanayam has also suggested that developing countries should move the world court to seek a ruling whether nuclear arms are legitimate weapons of defence under the U.N. charter. According to him, developing countries should extend "financial support to the anti-nuclear war movements in the developed nations and keep the anti-nuclear debate alive at a popular level in these societies." Describing the present nuclear world order "Pax Atomica of the nuclear weapon powers" on the developing world, Mr. Subrahmanayam has questioned the validity of the argument that NPT and nuclear weapon-free zones are arms control measures. [Bombay THE TIMES OF INDIA in English 9 May 82 p 5]

CSO: 5100/7095

EDITORIAL SUGGESTS USING NUCLEAR EXPLOSION TO BUILD CANAL

Bangkok THE NATION REVIEW in English 24 Apr 82 p 4

[Editorial: "Kra Canal: Why Not Revive the Nuclear Option?"]

[Text] IT IS A PITY THAT historians write only about what actually happened or what they thought happened. They never write about what did not happen nor what would never have happened. In other words, what we mean is that historians do not write about non-stories. We would like to evaluate whether the digging of the Kra Canal or the building of Bangkok's second airport at Nong Ngu-hao is the biggest recurring non-story of the past few decades. We would vote for the digging of the Kra Canal since it ante-dates World War II. But those who read Bangkok newspapers in 1971 and did not follow events in Thailand after that would believe that the Nong Ngu-hao airport has already been built by Northrup. But the cobras got a lease of life.

We are not at all surprised that the Kra Canal project has been revived again — we have lost count how many times it has been revived. We will not be surprised at all if the Nong Ngu-hao airport project is revived again too although we think that project has been milked dry. But the Kra Canal project had never reached that stage. Actually there is some post-World War II understanding or treaty between Britain and Thailand that the Kra Canal should not be dug because at that time Britain wanted to maintain the importance of her colony, Singapore. But that is history.

But those who have followed the evolution of the Kra Canal project as we have, should definitely allow that it is the most colourful project that has ever been thought of in the world — let alone Asia. In the early 1960s Edward Teller, the top American expert in the peaceful uses of atomic energy, said that the Kra Canal could be dug by the use of well-controlled atomic explosions and that it would cost far less than other ways of digging the canal. As far as development projects go, we have never heard of anything in the world that could match this surrealism.

There must be files, at least a mile high, in the Communications Ministry about the Kra Canal and nobody can presume he has read all the studies that have been made. But we do know that apart from 'digging' the canal there were to other proposals. These were due to the fact that super-tankers were taking oil from the Persian Gulf to Japan and the short-cut through the Kra Peninsula would cost Japan less and profit Thailand very much

Of course our brilliant planners of that time decided, despite Edward Teller, that they could not dig a canal (it required four locks similar to the Panama Canal) big enough for super-tankers to pass through. We have never been short of genius and so it was proposed that a gigantic oil pipeline should be built across Kra from the Andaman Sea to the Gulf of Siam so that one super-tanker at Andaman Sea side will feed the pipeline while another in the Gulf of

Siam would receive the oil and then speed it on its way to Japan. For reasons that were never fully explained this idea was consigned to limbo.

Then came the next brilliant idea and that was to build a super-highway across the Kra Isthmus and thousands and thousands of oil-tanker trucks would move petroleum from the Andaman Sea to the Gulf of Siam or from one super-tanker to another Somehow this idea too did not catch on. And now we are back to digging a canal. We do not know what has happened to Edward Teller, but if we can revive the idea of the peaceful use of atomic energy to dig the canal we would not only capture the imagination of Thais but of the entire world.

CSO: 5100/5660

URANIUM PROCESSING PLANT PLANNED

BK140445 Bangkok Voice of Free Asia in English 1100 GMT 13 May 82

[Text] It has been revealed that a uranium processing plant will be set up for the first time in Thailand to supply a radioactive compound for use as fuel in nuclear power plants. The secretary general of the Office of the Atomic Energy for Peace said that the uranium compound to be processed from monazite ores will be in the form of yellow cake. The yellow cake could be used as a fuel in nuclear power plants after it had undergone a specific simple process. The chief of the office has further revealed that the pilot plant will also yield two byproducts, rare earth oxide and trisodium phosphate, which could be used as material in various industries.

Dr Kannika Sirisena, who supervises the pilot project, disclosed that the plant would also yield a thorium compound, another radioactive element, which could theoretically fuel the production of electricity. The plant would be capable of processing about 300 tons of monazite into 42 tons of yellow cake annually. About 300 tons of trisodium phosphate and 150 tons [figures as heard] of rare earth oxide would also be yearly outputs of the plant.

Thailand imports a large amount of the two kinds of minerals for various branches of industry annually. The secretary general of the Office of the Atomic Energy for Peace disclosed that the Department of Mineral Resources had informed the office that it could supply the plant with 300 tons of monazite a year for 15 years. It has also been revealed that the project to build the uranium processing plant was contained in the 5th national economic and social development plan.

CSO: 5100/5661

NECESSITY FOR NUCLEAR ENERGY DEVELOPMENT ASSESSED

Warsaw ZYCIE WARSZAWY in Polish 24-25 Apr 82 pp 1, 2

[Interview with Mgr Eng Jan Kubit, plenipotentiary for nuclear power affairs of the Ministry of Mining and Power Industry; date and place not specified]

[Question] Nuclear powerplants already have been built by the Bulgarians, Czechoslovaks and East Germans. In these countries, power units with a total power output of 4,500 MW have been placed into operation.

Bulgaria has four 440-MW power units, Czechoslovakia has two 440-MW power units and the GDR has four 440-MW power units. The Hungarians are completing the construction of their first 440-MW power unit and the Czechoslovaks a similar third unit. What is more, 21 more power units, including 1,000-megawatters, with a combined power output of 12,000 MW are in the design and construction phase in these countries. Why are we so late in constructing a nuclear powerplant?

[Answer] If the concern here is about an executive decision, then the construction of Poland's first nuclear powerplant is at least 10 years behind schedule. The resolution to build the Zarnowiec power complex, consisting of a hydropower plant, a 680-MW pumped-storage powerplant and a 1,500-2,000 MW nuclear powerplant, was passed in 1971. The nuclear powerplant was to deliver 800 MW to the hydropower plant, which was needed to pump water from Lake Zarnowiec to the upper reservoir at night. The first 170-MW power unit of the hydropower plant is already operating, but the decision to begin construction of thenuclear powerplant remained on paper till January 1982.

[Question] Why was that?

[Answer] There were several reasons. In the 1970's the prevailing viewpoint was that we had unlimited reserves of coal. The saying that "Poland is sitting on coal" was in vogue. However, brutal reality demonstrated that we would be unable to produce on the order of 200 million tons of hard coal annually. Investments in mining are exceedingly labor-intensive. In addition, hard coal is not only for burning; it also should be used in chemical processing, including coking and gasification processes.

However, the opinion regarding unlimited reserves of hard coal hampered the development of the power industry based on brown coal and nuclear energy.

There was another reason. Entering the nuclear power field is new to our technology. It is a matter of mastering the production of special materials and unusually complex equipment, in addition to mastering and becoming familiar with reactor technology.

Of course someone else could have built a nuclear powerplant for us and supplied a complete set of equipment. But this would be primitive thinking. The question must always be asked; how could one pay for this? Today we can answer this question. In 1979 an agreement on cooperation and specialization in the production of nuclear energy equipment was signed by the CEMA countries. Poland participates in this international division of labor. We have become a provider of high-percision equipment such as heat exchangers, pressure stabilizers, emergency electric power supply units, transport equipment, nuclear electronic systems and the like.

The third reason for the delay is the relatively low level of technical knwoledge of the public and the decisionmakers concerning atomic energy, and their fears about the effectiveness of radiation safeguards in nuclear powerplants.

[Question] Some opponents of nuclear power have become proponents.

[Answer] The necessity to build a nuclear powerplant will be decided by irrefutable arguments. The energy-fuel balance is of fundamental importance. There is a shortage of conventional fuels. Until 1990, the basic growth in electric power will come from the Belchatow powerplant, where 12 360-MW turbine units will be installed. This will be a powerful injection of 4,300 MW. But further expansion of the electric power industry based on brown coal will become complicated. Also, the balance of water resources is limited. For example, the Vistula program can assure only 2,000 MW--and not very soon--with continuing high-cost investments. Thus, there is no othe solution except to develop the nuclear power industry.

[Question] But will Poland's socioeconomic situation permit such an investment?

[Answer] Should we stagnate, limit Poland's development? Without the power industry as the basic foundation, there is nothing to say. Therefore, the question is rhetorical. In addition, this will not be a reckless investment. It will be done in a rational manner.

[Question] What will the Zarnowiec nuclear powerplant cost?

[Answer] The first stage should cost 44 billion zlotys (1980 zlotys) and will consist of two power units of 440 MW each with a reactor and of 465 MW with a turbine set (efficient Polish turbines built under a Swiss-Bovern license will be installed); the complete project consisting of four 440-MW power units will cost 70 billion zlotys. Is this a lot? Yes, it is. But if the annual investment costs in previous years amounted to 600 billion zlotys and this year will be 430 billion zlotys, the percentage will be small as long as outlays for the nuclear powerplant are distributed over many years. For example, this year's outlays will be barely 1 billion zlotys, next year it will be 2 billion zlotys and so forth. In the current 5-year period 12 billion zlotys will be spent. The powerplant's first power unit will become operational only in the 1988-1989 period.

Over 50 percent of the equipment for the first stage of the powerplant will be provided domestically. But our industry will also earn money on the remaining equipment, which will be imported because the export value of equipment produced for the nuclear powerplants will exceed the value of imports for the Zarnowiec plant.

The technology and design of the basic equipment were developed in the Soviet Union. A Soviet design bureau is executing the working design of the Zarnowiec nuclear powerplant. This country is also assuming responsibility for supplies, which till now were purchased in the West. At the same time the share of imports from the capitalist countries will be practically negligible. The Soviet Union will supply the nuclear fuel.

[Question] Are we prepared to undertake such an investment?

[Answer] Seven thousand Polish specialists are working on the construction of nuclear powerplants in the CEMA countries. This is a lot of potential. One should ask if the building of a nuclear powerplant requires something specific, exceptional. Of course, it does not. However, it requires the systematic, conscientious execution of work in accordance with the documents.

[Question] Will the nuclear powerplant pose a danger to nearby residents?

[Answer] First I will tell you why a nuclear powerplnat is not harmful. Above all, it does not occupy terrain like a thermal electric powerplant, with heaps of furnace fuel and ashes. It also does not appropriate farmlands like powerplants fueled with brown coal. Finally, it does not pollute the air with sulfur oxides, carbon monixide and radioactive substances contained in carbon.

The public continues to bear a certain scepticism and mistrust regarding nuclear powerplants caused by the fear of radiation. But with strict adherence to radiation safety principles, a nuclear powerplant is no more dangerous than any industrial plant. Exceedingly strict disciplines are obligatory here, and devices constantly monitoring the level of radiation are located in the area of the powerplant itself and in the zone of protection. The smallest deviation from the standards will shut down the reactor immediately. About 260 reactors are operating in the world. Accidents have happened at very few powerplants. None of these accidents imperiled human life or health.

The safe WWER 440-type reactors (pressurized water reactors), which have been tested in many countries, will be installed at Zarnowiec. Their performance is exceptional and to date failure-free. They are even more expensive than others of the most modern design. Many of our scientists questioned the selection of these reactors. But those reactors were selected because they were verified as guaranteeing safety of operation. The cost of safety in the reactor portion approaches 30 percent. But such costs must be borne since safety must have priority over economics in a nuclear powerplant.

[Question] What will happen after Zarnowiec?

[Answer] After 1990, practically the entire increase in electric power should come from nuclear powerplants. In accordance with capability and not need, in the year 2000 the installed power in nuclear powerplants will amount to an estimated 15,000 MW.

Subsequent powerplants will be new generation powerplants with 1,000-MW reactors. The 4,000-MW Kujawy power plant is supposed to follow the Zarnowiec powerplants. From five to six such powerplants must be built by the year 2000.

[Question] I agree with your arguments regarding the need to build nuclear powerplants, but I doubt if we can do this in a period of crisis.

11899
CSO: 5100/3018

CZECHOSLOVAKIA

NUCLEAR DEVELOPMENT IN CSSR REVIEWED

Prague SVET HOSPODARSTVI in Czech 2 Mar 82 pp 1-2

[Article by Eng Miroslav Cibula, CSc, State Planning Commission: "Development of Nuclear Energy in the CSSR"]

> [Text] According to current development concepts and consistent with agreements with the USSR and other CEMA member states on cooperation and collaboration in the production of nuclear power technology, 12 power units are to be constructed in the CSSR with light-water reactors of the Soviet VVER 440 type. There will be four units each in three locations: Jaslovske Bohunice, Dukovany and Mochovce. The first two of these units were put into operation between 1978 and 1980 in the V 1 nuclear power station, Jaslovske Bohumice. By 1986 six more units are to be in operation and construction of the remaining four units is to be completed in the years 1987 -89. Other Czechoslovak nuclear power stations will be built with the more efficient and economical VVER 1000 reactors.

The results of 3 years' operation of nuclear power station V 1 in Jaslovske Bohunice (2 x 440 mw) confirm the high reliability, safety and efficiency of hydraulic nuclear reactors of Soviet design. The first unit of this station attained full performance in a reduced period and as early as the winter of 1978-79 its reliable operation helped resolve the disastrous situation in supplying coal to traditional power stations at that time. In 1979, during a test run this unit produced 2.1 billion kwh and attained an annual utilization of planned capacity of 5045 hours. In 1980 the V 1 nuclear station produced 4.5 killion kwh and in 1981 5.2 billion kwh. The coefficient of utilization of the operational equipment of this power station was 14.5 percent higher in 1981 than in the largest Czechoslovak power stations with coal units of 200 mw. In addition, nuclear station V 1 not only underwent a scheduled exchange of fuel elements but overall time loss in the summer months was extended for the time necessary to make the first periodic preventive checkup of all the equipment of unit No 1.

Czechoslovak nuclear power, even though in the initial stages of development, plays a considerable part in meeting the domestic consumption of primary energy sources. In the last five-year plan (1976-1980) the use of nuclear fuel covered 16 percent of the increased consumption of primary energy sources and 60 percent of the increased consumption of electricity. Even though such a large proportion of nuclear power was achieved with a distinct reduction in the growth of consumption of domestic and imported fossil fuels, it must be realized that it was accomplished with only two nuclear energy units with VVER 440 reactors operating only in the last 2 years of the Sixth Five-Year Plan.

[There is a break in the text at this point. The next line begins in lower case with the antecedent missing. Translator's note]

...was to provide not only the entire increase of Czechoslovak consumption of electricity but also make it possible to gradually reduce the production of electricity based on high quality imported fuels and kinds of domestic coals that are in short supply. It is expected that the production of electricity in power stations using fossil fuels will reach its peak level as early as this year and by 1985 it will be reduced by about 8.5 percent. In 1985 Czechoslovak nuclear power stations should be producing about 15 billion kwh. This represents approximately the same amount of electricity as was produced altogether by all Czechoslovak electric generating plants in 1955. The fuel equivalent of this production represents 16 million tons of brown coal.

According to prognostic studies, by the year 1990 the proportion of nuclear fuel in Czechoslovak consumption of primary fuel sources could increase to 16 percent and nuclear power plants should be providing about one-third of the electricity consumption. Somewhere in the mid-1990's, the production of electricity in nuclear generating plants should be higher than in coal-fired facilities. The construction of the generating capacity necessary for this has already been assured to a considerable extent.

In the Seventh Five-Year Plan, work on the first stage of construction of nuclear station Temelin in southern Bohemia will proceed on the basis of an agreement between the governments of the CSSR and the USSR. This power station, which is to have a total capacity of 4,000 mw, will contain units with VVER 1000 reactors, the first of which should become operational in 1990. The annual production of this power station will represent over 25 billion kwh which compares to almost one-third of the current annual consumption of electricity in the CSSR. So great a concentration of generating capacity is unique in our electric power industry up to now. Of course it will provide great opportunities for increasing labor productivity among all participants of construction and will save attendant and induced investment. In the USSR, power stations of the same type are built according to a design model with a great amount of building prefabs and mechanized facilities for construction and assembly work.

Further expected rises in the cost of world fuels and energy, deteriorating conditions for extracting domestic brown and black coal and the impossibility of developing other energy resources to the extent necessary for maximum economical development of an alternative energy base has compelled the CSSR to give priority direction to intensive construction of nuclear energy production capacities.

Czechoslovak nuclear power will be very important in solving the problems of supplying heat in the 1990s. The VVER 440 reactor unit is expected to supply only a small amount of heat from unregulated extraction from the condensing turbines. In the case of the VVER 1000 units, however, the installation of thermal extracting turbines is expected. For this reason, the other nuclear generating stations must be constructed at sites that not only meet the needs of the electrification system but also will be able to supply heat to large industrial and urban centers. Several alternative possibilities for constructing nuclear heating plants to provide housing developments and industry with hot water are under investigation. It would appear to be advantageous to place these assets particularly where they could free considerable quantities of currently used liquid fuels whose consumption for thermal purposes is highly inefficient and will be greatly limited in the future.

In 1990, 94 percent of nuclear power production could be used for the generation of electricity and 6 percent for heat production. After 1990 it should be feasible to attain a higher proportion of heat production, not only from thermal operation of the units with VVER 1000 reactors and construction of nuclear heating plants, but also by utilizing some of the wasted heat which can be put to good use especially in agriculture and food processing complexes.

Multiple-purpose use of nuclear energy increases its contribution to the future energy assessment of the CSSR. The shortage of other energy sources hastens the resolution of associated problems.

The combined generation of electricity and delivery of heat together with utilization of most of the waste heat can double the effectiveness of nuclear condensing power stations. Furthermore, every 1 percent of increased energy effectiveness from units with VVER 440 reactors represents an annual savings equivalent to 7,500 tons of heating oil.

Since the development of coal extraction and other domestic sources of energy is at its maximum level, the utilization of nuclear power in electroenergy and thermal plants will, between 1981 and 1990, save about 75 million tons of standard fuel, an amount which would have to be imported from abroad in the form of coal, petroleum or natural gas. According to prognostic calculations, the cost of importing these fuels in comparison with the costs of importing nuclear energy would be at least 2 1/2 times as high.

The economic return for replacing conventional fuels with nuclear fuel with its manifold higher concentration of energy potential is reflected in the national economy not only in electric power and thermal power but also in the fuel industry, transportation and industrial branches were production pays for the importation of fuels and energy from abroad. The efficiency of nuclear power development must therefore be considered from an intersectoral viewpoint and not only according to construction and operational costs of nuclear power stations.

Comparing the economics of foreign and Czechoslovak nuclear power stations and their fuel cycles with the economics of conventional thermal pwoer facilities and their fuel base confirms the economic efficiency of nuclear electric power.

Construction costs of nuclear power stations can be as much as 50 percent higher than for thermal power stations. The situation is the reverse in regard to fuel and production costs. Fuel costs are 50 to 70 percent lower than fuel costs for coal-fired power stations. After projecting these data on the differences of comprehensive investment and fuel costs, the resulting costs under our conditions of production for 1 unit of energy in nuclear power stations are at least 20 percent lower than in coal-fired facilities.

The economics of nuclear power will further improve with the recycling of nuclear fuel. At the present time, light-water reactors are operated in so-called open fuel cycles which means that burned out fuel, after a certain period of storage, is not reprocessed for further use. This method of operation is more demanding on the consumption of natural uranium by about 30 percent than it will be in the future, after the introduction of recycling of leftover enriched uranium and newly derived plutonium.

Consequently, orientation toward the use of nuclear power is advantageous also from the economic point of view. The changes connected with the shift to building a whole new addition to basic electricity generation by nuclear power generation which is more demanding in technology and investment will affect the manufacturing process and galvanize the structural rebuilding of the economy and especially the management of energy. So it is very important to make a systematic analysis of critical factors determining the optimal extent and efficiency of building nuclear sources of electric power and heat. Slowing down the development of nuclear power with respect to the program outlined would have an impact on the whole national economy. It is shown that even with implementation of very economical development alternatives of energy management it will still be to our advantage to build nuclear power according to the alternatives closest to the upper limit of its development prognosis. A slippage in construction of nuclear energy capacity of 1 year would lead as early as 1985 to increasing the need for imported fuel by 1 to 2 million tons of standard fuel annually, a great burden economically.

The development of nuclear power could effectively guarantee a sufficient increase in energy consumption in the CSSR even if supplies of fuel and energy available from hitherto conventional sources were to stagnate or gradually decline.

Our nuclear energy is developing as an integral part of the nuclear power of CEMA member states. Its development to the year 1990 is based on international agreements concluded with the USSR and other substantively involved CEMA member states. Not only is the cooperative production of equipment components for the light-water VVER 440 and VVER 1000 reactors based on these accords but also cooperation in the construction, mastery and operation of the power stations with these reactors. These agreements also guarantee to the CSSR the delivery of nuclear fuel from the USSR for all nuclear power stations built. Consequently, the construction of the nuclear power stations in the required time periods remains a critical problem.

The results of the construction and operation of nuclear power stations up to now confirm the feasibility of the long-range development programs for Czechoslovak nuclear energy.

8491
CSO: 5100/3019

NUCLEAR BUDGET, PLAN EXCLUDED FROM ECONOMIC RESTRICTIONS

Buenos Aires ENERGEIA in Spanish Apr 82 pp 547-548

[Article by Martin F. Yriart: "Nuclear Plan: Today's Seed, Tomorrow's Fruit"]

[Text] For the second year in a row, after protracted lobbying and negotiations, only the personal intervention of the incumbent Executive Power saved the CNEA [National Atomic Energy Commission] budget from the inexorable scissors and thus prevented imminent paralysis of the Nuclear Plan.

After making a careful analysis of expenditures which could be deferred, the CNEA presented at the beginning of the year a request for funds for 1982 on the order of 8 billion pesos. This figure greatly exceeded the ceiling stipulated in Treasury Department directives and it was to be anticipated that it would arouse in Minister [of Economy] Roberto Teodora Alemann an antagonistic reaction. Worthy as the reasons set forth by the CNEA were, the doctrinaire and inflexible position of the minister regarding elimination of a budget deficit was well known. In fact, during the whole month of February and part of March, the Treasury Department generated all sorts of stories about the budget cut which CNEA would have to accept.

In the arguments of the Argentine atomic organization, there was on the other hand nothing new. The Executive Power had established a Nuclear Plan with exact time limits for its phased execution. In carrying this out, the CNEA had made contractual commitments within and outside of the country amounting to thousands of millions of dollars. A budget reduction would put CNEA in the position of having to defer practically all large-scale works initiated or projected during the last 24 months.

Regarding Argentine energy supplies, these postponements would certainly mean an inevitable shortage before the end of the current decade.

A very immediate effect would have been the necessity of renegotiating contracts--especially with international suppliers--with an inevitable increase in the financial cost of projected works, and that would have come down heavily on the whole national economy.

Third and last, but no less important, would be the negative effect of that renegotiation on the credibility of the Argentine Nuclear Plan, both within and outside of the country.

At the beginning of March, the minister of economy made it known that the CNEA would have to reduce its budget for 1982 by 2.5 billion pesos. CNEA's answer was that the maximum possible reduction of the figure originally submitted was 1.2 billion pesos. A greater cut in its budget would lead to a paralysis of critical works such as the heavy water plant at Arroyito, renegotiations and already mentioned costs.

Having thus stated the situation, the final decision was in the hands of Lieutenant General Galtieri. It was not surprising that the result was favorable to CNEA's position. The Nuclear Plan is one of the few indisputable "assets" which the administration of the Armed Forces has had in its favor these 6 years.

The result is a budget approximately equal to the one of 1980 and 10 percent higher than the one of 1981. The amount finally agreed upon means, however, that there will be delays in certain projects and programs. These are not those from which an immediate repercussion will be felt, but the required financing of these will have to be restored in the near future or else the soundness and solvency of the present scientific and technological position in Argentine nuclear development could deteriorate within a not very long period of time.

The clearest case is that of the future design and construction of the power reactors for nuclear power plants.

With Atucha II, Argentina entered a transition phase which would allow her to put an end to her forced dependence on foreign suppliers for the design of her nuclear power plants and the supply of their critical components. Both Atucha I and Embalse, it will be remembered, were "turn-key" projects respectively awarded to Germany and Canada (the latter in collaboration with Italy).

In the case of Atucha II, the contract terms are completely different because they stipulate that the supplier of the technology and the chief components--the German firm Kraftwerk Union A. G., a subsidiary of Siemens, must form an engineering company in which CNEA will hold the greater share of capital stock. CNEA will thus play the role of "industrial architect" and will be the recipient of the German know-how, looking forward to the progressively decreasing stock investment of KWU in the company to the point where it disappears completely as it is progressively replaced by national private capital.

The transfer of technology thus achieved will not, however, entirely end the problem. The design of the KWU reactors imposes limitations upon their manufacture in this country because components like the pressure vessel, with dimensions and exceptional technical requirements still determined by international standards, will require uneconomical installations and development. A possible alternative is presented by the reactors of the Embalse type, with pressure pipes originated in Canada.

In a paper presented at the beginning of March in Tokyo, a study which has not yet had the dissemination it deserves in our country, engineer Jorge Cosentino (who recently in CNEA was put in charge of studies on the fourth power plant) states the following: "In accordance with the timetable of the Argentine

Nuclear Plan, it (the fourth nuclear power plant) should begin operating in 1991 and be, in principle, of the pressure pipe type." And he adds, "The CNEA decided about the middle of 1981 to begin developing the information required for making the decision which will have to be made about the middle of 1983 at the latest."

"Nevertheless," he says later on, "the difficulties involved in choosing the type of reactor to be used in the fourth power plant should not be underestimated. The decision that the next nuclear power plant be in principle of the pressure pipe type reflects the opinion, today still prevalent among many of those involved in the Argentine Nuclear Plan, that this concept is the most advantageous from various points of view such as adaptation to national conditions and construction costs."

"That decision," engineer Cosentino concludes, "will probably affect not only the fourth nuclear power plant but also subsequent power plants in the Nuclear Plan and consequently it requires careful analysis."

In summary, then it is a question of knowing whether Argentina will be able to acquire the know-how for the construction of a reactor with pipes; whether it will have to achieve some special development; and whether it can do it alone or will have to rely on foreign assistance (and, if the latter, how much and from whom).

To judge from past experience, the most probable outcome will be that, although Argentina will obtain Canadian approval for use of the CANDU design--about which there are some reservations--this country will still have to exert a considerable effort on its own, both with regard to engineering a nuclear steam supply system as well as to the preparation of local industry to provide those components which can be manufactured in this country.

This effort requires long-term investments, the contribution of valuable human resources from both the state and private sectors, and confidence in the visibility of the project on the part of those enterprises brought together to participate in it.

And all this will only be possible if the Nuclear Plan maintains the vigorous pace shown up to now and if it does not neglect, with fleeting arguments, the long-term investments in research, in the training of human resources, in development, and in the transfer of technology from the R&D [Research and Development] sector to the industrial and engineering sector.

9972
CSO: 5100/2161

BRIEFS

KUWAIT,TUNISIA DEAL --Kuwait and Tunisia are to cooperate in a $40 million project to produce uranium, the Kuwaiti newspaper AL-WATAN reported last week. Phosphoric acid produced from phosphates, which are abundant in Tunisia, will be used to separate the uranium from waste products. According to AL-WATAN, the deal will provide 120 tons of uranium for the Arab nuclear effort in 1984. An earlier report from Paris indicated that the plant will produce 132 tons of uranium a year when it is completed in 1985 (AN-NAHAR ARAB REPORT & MEMO, April 12). The French Company Uranium Pechiney Ugine Kuhlmann, is to provide technical assistance to the Tunisian chemical concern Société Tunisienne des Industries Chimiques Maghrébines for the project, which will be located at Gabes in southeastern Tunisia. The Tunisian and Kuwaiti governments are studying plans to establish an Arab nuclear research centre in Tunisia to be devoted to research into the use of nuclear energy for peaceful purposes. Earlier this year, Kuwait informed visiting Canadian Energy Minister Marc Lalonde of its interest in buying four Candu heavy water nuclear reactors (AN-NAHAR ARAB REPORT & MEMO, February 1). Two months ago Qatar hosted an Arab energy conference which called on Arab countries to develop their own sources of nuclear fuel with an eye to a future move into nuclear energy. [Text] [Paris AN-NAHAR ARAB REPORT & MEMO in English No 18, 3 May 82 p 10]

CSO: 5300/4715

NUCLEAR ENERGY SITUATION IN ARAB NATIONS REVIEWED

London AL-DUSTUR in Arabic No 231, 26 Apr 82 pp 36-37

[Article: "Extraction of Uranium From Arab Phosphate!: The Arab World Decides To Turn to the 'Nuclear Alternative'"]

[Text] The Arabs and nuclear power: The "nuclear alternative," which most of the industrial nations have turned to in their efforts to diversify their sources of energy and partially reduce their dependence on oil, has also begun to acquire increasing importance among the nations of the Third World, especially those which import their oil from other countries. Most of the industrial nations view the nuclear alternative as something which is inevitable for the future since most of the other traditional sources of energy will run out. But the Arab nations--or at least most of them--are making the nuclear alternative a high priority, even though they have abundant other sources of energy.

Ten out of 21 Arab nations are making efforts to acquire nuclear power. In eight of these countries the economic feasibility of this has been shown, and the other two nations are still in the stage of initial research. As in the case of [nuclear] power programs anywhere in the world, there are those who are in favor of, and those who are against, nuclear power programs in the Arab world.

Those opposed to the programs emphasize the danger which this alternative would constitute for the Arab countries, and say that the other sources of energy are sufficient and more than enough for local needs. Those who are in favor of nuclear power consider these programs to be an economic necessity for meeting some local energy requirements which, in the future, are expected to consume most of the petroleum produced.

In the Arab world, opposition to efforts to acquire nuclear power has not yet crystallized and is still confined to specialized academic circles. In the industrial nations of the West, however, such opposition has been transformed into mass movements which are opposed to all efforts to acquire nuclear power and which warn of the consequences of constructing more reactors which might threaten the future of mankind. These groups which are opposed to nuclear power are enjoying increasing popularity, and they are highly organized, especially in nations such as Britain, the United States and West Germany.

Some of these groups have been the victims of police brutality in other nations such as France and Holland. In this report we will review the "nuclear alternative" from the standpoint of its importance to the Arab nations and the potential of each individual [Arab] nation in terms of the technology of its nuclear reactors and the existence of uranium fuel in its territory. The report shows that most of the Arab nations which have begun nuclear programs are determined to economically utilize these programs in order to produce power. By the end of this century, the amount of electric power produced by nuclear reactors in the Arab world will total about 7,500 megawatts. Furthermore, the Arab world is self-sufficient in uranium fuel, which needs to be enriched before it is utilized in reactors. At the present time the technology of uranium enrichment is restricted to the Western industrial nations and the Soviet Union.

As far as nuclear reactor research and technology are concerned, there are eight Arab nations which are on the threshold of utilizing nuclear power, and some of these actually possess reactors which produce great amounts of power.

Iraq: The [Iraqi] Atomic Energy Committee which was founded in Baghdad in 1956 is one of the oldest atomic energy committees in the Arab world. Right now practical research is being conducted with experimental reactors in the Tuwaythah Institute and at the Baghdad Research Center. Also, nuclear cooperation agreements have been concluded between Iraq and the Soviet Union, France, and Italy. Iraq has a Soviet reactor which operates at a capacity of 2 megawatts. Work on the Osiris reactor (with a capacity of 600 megawatts) was scheduled to be finished in 1985, but the Zionist bombing of this reactor has delayed production plans somewhat. At the present time negotiations are being conducted concerning rapid construction of a power-generating reactor. According to International [Atomic] Energy Agency data, during the 1990's Iraq is scheduled to begin the construction of six reactors, the capacity of each of which will be 200 megawatts, and this means that by the end of the twentieth century Iraq's total nuclear power capacity will be 2,000 megawatts.

Kuwait: Kuwait will not be producing electricity by means of nuclear power before the beginning of the 1990's. Plans include the construction of a nuclear power station with a capacity of 600 megawatts during the second half of the 1980's. This will be followed by the construction of two reactors, the capacity of each of which will be 1,200 megawatts. In the field of nuclear power Kuwait is working together with Britain since a joint cooperation agreement in this field between the two countries has been signed. Kuwait's total capacity in nuclear power will be 1,800 megawatts by the year 2000.

Algeria: In 1976 a republican decree was issued which dealt with the establishment of a nuclear strategy, based on self-reliance, which would provide for development of a permanent source of energy. Immediately an ambitious program for the development of nuclear technology began, and half of the budget for science and technology was allocated to the activities of [Algeria's] nuclear science center. The Algerian Government expects to build its reactors in the near future. According to International Atomic Energy Agency data, by the year 1990 Algeria will possess three nuclear units, the capacity of each of which will be 150 megawatts, and their capacity will double by the end of the twentieth century.

Egypt: There are plans to construct, between 1987 and 1990, four nuclear power stations which will produce a total of 1,800 megawatts of power. Right now steps are being taken to construct the first of these power stations in Sidi Kurayr, on the northwestern coastline near Alexandria, and it will have a capacity of 600 megawatts. Other areas between the Western Desert and the Red Sea coast are currently under study. It is anticipated that the generation of nuclear power will account for 13 percent of the electric power produced in Egypt in 1990, and this figure is expected to go up to 22 percent by the year 2000.

Libya: [Libya's] Atomic Energy Committee was founded in 1975. Recently laboratory research began in Al-Fatih University, in cooperation with the Soviet Union. International reports tell us that the Soviets intend to build a reactor having a capacity of 440 megawatts, and negotiations are going on with the French to build another power station having a capacity of 600 megawatts. The Libyan Ministry of Electricity anticipates that a plant having a capacity of 400 megawatts will begin providing services by the year 1990.

Saudi Arabia: The Saudis currently do not intend to make practical commercial use of nuclear power. But in Saudi universities there is a noticeable degree of interest in research and development activities [dealing with nuclear power]. An agreement has been concluded with France to set up an experimental reactor having a capacity of 6 megawatts in the University of Dhahran. The Saudi Ministry of Petroleum is planning to establish a research center which will be in charge of matters concerning nuclear energy. The International Atomic Energy Agency anticipates that a unit having a capacity of 150 megawatts will be operating in Saudi Arabia during the 1990's, and that its capacity will double by the end of the present century.

Morocco: Negotiations are currently being conducted with France concerning the construction of a reactor having a capacity of 200 megawatts. This program would be implemented in 1985. Also, theoretical research is being conducted in Rabat University. The International Atomic Energy Agency anticipates that Morocco's [total] nuclear power capacity will be 400 megawatts by 1990, and will total 600 megawatts by the year 2000.

Tunisia: Nuclear power research is being conducted in Tunisia at the Institute of Scientific and Technical Research. There are plans to produce electricity by means of nuclear power by the end of the 1980's, using a reactor having a capacity of 250 megawatts. The capacity of this reactor will triple by the end of the present century.

Nuclear Fuel

Concerning the matter of exploration for nuclear fuel and available uranium and thorium, most of the Arab nations consider mining for radioactive materials to be a national priority since any nation having nuclear aspirations needs to provide for its nuclear fuel requirements. The importance of reserves of nuclear fuel in the Arab world is increasing in view of the predictions concerning the scarcity of nuclear fuel in the world and in view of the controls and embargo which international commerce in uranium is subject to.

Exploration [for nuclear fuel] is going on in most of the Arab countries. It began in 1970 in Algeria. Algeria has estimated reserves of approximately 58,000 tons of uranium, and this is sufficient for the needs of several Arab [nuclear power] programs. There have also been important finds in Egypt, especially in the Eastern Desert near Jabal Jalal. Right now a plant is being constructed which will produce 100 tons of uranium per year. Production in the plant will begin by the end of this year.

In this regard there have also been encouraging developments in some parts of Iraq, in Jordan's Wadi al-Zarga', and in the south of Libya. Furthermore, Morocco has had notable success in the field of mining uranium and its uranium reserves are estimated at about 1.4 million tons. Also, there are an estimated 10,000 tons of uranium reserves in Somalia. In addition to this, in Saudi Arabia, Sudan, Mauritania, and the UAE there are encouraging indications [concerning the finding of nuclear fuel] which merit additional study.

Phosphate

It should be mentioned that the United States invented the chemical process of producing uranium from phosphate (and that the United States currently has a monopoly on the utilization of this process). This chemical process is considered to be one of the most important scientific discoveries which concern the Arab world since the Arab world has a total of 50 billion tons of phosphate reserves, that is, more than 40 percent of the world's reserves. Theoretically the Arab world could extract 6 million tons of uranium oxide by utilizing the American process. This process first transforms the phosphate into phosphoric acid, and then the uranium is extracted as a by-product during the production of phosphate fertilizers.

It is expected that the first Arab plant for the extraction of uranium from phosphate will be built in Morocco, the country which has three-fourths of the Arab world's [phosphate] reserves and produces two-thirds of its phosphate. Efforts to achieve this objective are being made jointly with the U.S. corporation Westinghouse.

It might be that the "nuclear alternative" is not an urgent necessity for the Arab world at the present time due to the availability of other sources of energy and the ease with which they can be extracted. However, most of the Arab nations are putting it in a prominent place in their list of priorities. They have the potential and resources which can make this alternative a real possibility. This is an encouraging fact in view of the objections, obstacles, and pressures being exerted by the industrial nations in order to maintain their monopoly in this field. Current evidence convincingly indicates that the Arab world has decided to utilize nuclear power in its efforts to achieve development in the future.

9468
CSO: 5100/4718

BRIEFS

NUCLEAR ENERGY TURNED DOWN--Nairobi has turned down an offer from the German company KWU to supply it with a 300 MW power plant. Although it is one of Africa's most advanced countries in the nuclear field, Kenya has finally decided not to get into nuclear-based production of electricity before the turn of the century. Reasons cited include: a shortage of technicians and an inadequate network. If a 100MW model were to show up this decision could change, but, even if such a model does come about, its profitability will be marginal. [Text] [Paris DEFENSE ET DIPLOMATIE in French 10 May 82 p 8]

CSO: 5100/5666

CLUE MANAGER DENIES OPERATIONS ABOUT TO BE SHUT DOWN

Monrovia DAILY OBSERVER in English 13 May 82 pp 1, 10, 12

[Excerpt]

There is growing speculation that the Coastal Liberia Uranium Enterprises Inc. (CLUE), a private American company exploring for commercial uranium in Liberia, is about to close down its operations here in apparent preparent to leave the country.

But CLUE's Operations manager, Mr. Leslie Kaye, has vehemently denied this speculation.

When contacted by this newspaper for his reaction, he said that for economic reasons, it would be ''premature and unbusinesslike'' to terminate a legal contractual agreement entered into by and between the Govern-

The Acting Minister of Lands, Mines and Energy, Mr. William A. Freeman, also told our reporter that he had no knowledge of CLUE's Intention to close down and leave the country.

However, the Daily Observer has reliably learnt that the company has recently declared some 75 of its local employees ''redundant'' including its office manager, Mr. Max B. King, administrators, Liberian geologists, drivers and cooks.

We have also learnt that CLUE has been selling a great deal of its equipment, including vehicles, from its warehouses on ELWA Road in Paynesville.

Of the company's 17 expatriates, only three are said to be in active service and the rest are believed to have returned home or about to leave.

Acting Minister Freeman told the Daily Observer yesterday that as far as he knew CLUE had an initial nine-year contractual agreement (in three phases for three years each) to explore uranium deposits in Liberia.

Owing to the fact that the company had already spent $11M on the program, Mr. Freeman reasoned that it would be unlikely, or for that matter, not in the best interest of the two parties, for CLUE to terminate its activities abruptly.

Asked what could Government do in such a case, he indicated that terms of the agreement remain in tact and alive as ever, and Government can pursue its rights as provided under the Government. He maintained that the Liberian Government remains firmly committed to the said agreement, and nothing to the contrary was being conceived.

But Mr. Kaye explained that the exploration activities of CLUE are carried out on a seasonal basis, for both dry and rainy seasons. During the dry period, which runs from October to April, of each operational year, the company is very active in exploring uranium and associated minerals as approved under the contract. But this is not so in the rainy period (May to September), at which time, he said, operations are reduced due to unfavorable geochemical factors for exploration and environmental reasons.

It is during the reduced operations season, Mr. Kaye said, that many of the field workers, except for those at the Monrovia central office, are disengaged and their activities terminated temporarily. Many of our workers are re-employed afterwards, he added.

CLU Enterprises has been operating in Liberia since November 1977, when the agreement incorporating the company and underlining its objectives was formally signed by the Government of Liberia and the Management of CLUE and its parent body, Western Enterprises, Inc., a Delaware based-American corporation.

Low profile

According to the Ministry of Lands, Mines & Energy, the primary objective of CLUE's exploration program has been to discover uranium deposit in Liberia of commercial or marketable quality and quantity.

Mr. Kaye, a 54 year-old Canadian, said CLUE has been doing just that, covering an exploration area of some 20,000 square miles from the start in 1977 in Bong. Namba. Grand Bassa and Montserrado Counties and parts of Grand Cape Mount and Grand Gedeh Counties. Although uranium deposits have been found in the exploration areas prescribed, the Manager stressed that no uranium of economic value has yet been discovered.

The company has already spent more than $11 million on explorations alone, he indicated, yet nothing of commercial value has been found.

As a result and because of this, Mr. Kaye emphasized that the company would prefer at this point to operate on a "low profile", reducing the level of its activities.

Also he said CLU Enterprises has approached Government for expansion rights that would allow the company to explore for and develop other minerals in addition to uranium, that may be encountered during the course of uranium exploration within the concession areas. Some of the minerals envisaged include nickel, chromite and gold.

The Ministry of Lands, Mines and Energy confirmed this and indicated that negotiation with the company on the matter arm due to get underway shortly.

All this, Manager Leslie Kaye agreed, is being done to make the company flexible and viable in its future operations, taking into account the odds encountered so far in the exploration of uranium.

Beyond this, the Manager said the continuation of the company's operations here will also depend on world market conditions for uranium (the price of uranium has dropped on the world market), additional funding by the parent company of exploration activities and the level of activities of the company here.

"At the moment CLUE has no firm target for uranium, but the attractions are good." Mr. Kaye informed the Daily Observer Wednesday.

There is competition in other parts of Africa, Namibia, and the world, specifically Australia as regards the exports and mining of good quality uranium, a development which Mr. Kaye said has contributed to the low price of the mineral on the market.

CSO: 5100/5659

BRIEFS

PAPER ACCUSES WEST--The NIGERIAN STATESMAN in its editorial condemns the frequent supply of nuclear weapons to the racists in South Africa by Western nations. In the view of the paper, nuclear plants pose a very dangerous threat to the African people in particular and the Third World in general. The STATESMAN regrets that the United States, which feeds the venomous apartheid enclave in South Africa with nuclear weapons, has as a consequence disregarded the feelings of other African nations. However, the paper does not sanction the U.S. recent moves to use Africa as an arms depot and urges the OAU to vehemently oppose this diabolical proposal. [Excerpt] [AB251335 Lagos International Service in English 1130 GMT 25 May 82]

CSO: 5100/5662

BILL REGULATING NUCLEAR SAFETY, ENERGY PUBLISHED

Johannesburg THE CITIZEN in English 27 May 82 p 4

[Text]

A BILL providing for the establishment of the Atomic Energy Corporation of SA Ltd, a Council for Nuclear Safety and for licensing of nuclear activities was published yesterday.

The Nuclear Energy Bill, introduced by the Minister of Mineral and Energy Affairs, Mr F W de Klerk, has been read a first time.

It provides, among other things, for the regulation of licensing of certain nuclear activities and security connected therewith and liability in respect of nuclear damage.

Provision is also made for the control of source material and radio-active nuclides and certain patents for inventions relating to nuclear or atomic energy.

In terms of the provisions of the Bill, the sole right to produce nuclear or atomic energy is to be vested in the corporation on behalf of the State.

It also prohibits the production of nuclear or atomic energy, except under licence.

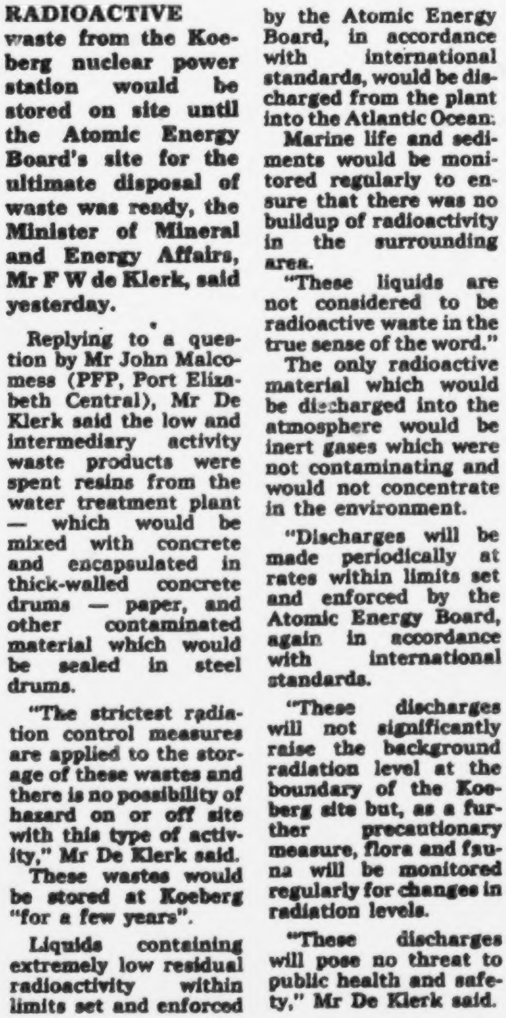
The Bill provides further that no vessel which is propelled by nuclear or atomic energy, or has on board any nuclear installation or nuclear-hazard material, shall enter the territorial waters of the Republic for the purpose of calling at any port within the Republic, or anchor or sojourn in the country's waters, except under the authority of a nuclear licence granted by the corporation.

CSO: 5100/5663

KOEBERG NO THREAT, SAYS DE KLERK

Johannesburg THE CITIZEN in English 22 May 82 p 11

[Text]



RADIOACTIVE waste from the Koeberg nuclear power station would be stored on site until the Atomic Energy Board's site for the ultimate disposal of waste was ready, the Minister of Mineral and Energy Affairs, Mr F W de Klerk, said yesterday.

Replying to a question by Mr John Malcomess (PFP, Port Elizabeth Central), Mr De Klerk said the low and intermediary activity waste products were spent resins from the water treatment plant — which would be mixed with concrete and encapsulated in thick-walled concrete drums — paper, and other contaminated material which would be sealed in steel drums.

"The strictest radiation control measures are applied to the storage of these wastes and there is no possibility of hazard on or off site with this type of activity," Mr De Klerk said.

These wastes would be stored at Koeberg "for a few years".

Liquids containing extremely low residual radioactivity within limits set and enforced by the Atomic Energy Board, in accordance with international standards, would be discharged from the plant into the Atlantic Ocean.

Marine life and sediments would be monitored regularly to ensure that there was no buildup of radioactivity in the surrounding area.

"These liquids are not considered to be radioactive waste in the true sense of the word."

The only radioactive material which would be discharged into the atmosphere would be inert gases which were not contaminating and would not concentrate in the environment.

"Discharges will be made periodically at rates within limits set and enforced by the Atomic Energy Board, again in accordance with international standards.

"These discharges will not significantly raise the background radiation level at the boundary of the Koeberg site but, as a further precautionary measure, flora and fauna will be monitored regularly for changes in radiation levels.

"These discharges will pose no threat to public health and safety," Mr De Klerk said.

CSO: 5100/5663

BRIEFS

RADIATION ALARM SYSTEM--Cape Town--Cape Town has become one of the few cities in the world with its own radiation monitoring system. The system which has been installed at six points in the municipal area will keep a constant check on radioactive emissions from the Koeberg nuclear power station. The early warning system can detect minute changes of atmospheric radioactivity and as soon as it reaches a certain level, yet to be determined, will activate an alarm in the civil defence headquarters in the Civic Centre. [Text] [Johannesburg THE CITIZEN in English 21 May 82 p 3]

CSO: 5100/5658

HAMBURG TO BUILD NUCLEAR, COAL-FIRED POWER PLANTS

Hamburg DER SPIEGEL in German 3 May 82 pp 115-117

[Article: "Threatening Embrace"]

[Text] Hamburg's new course in nuclear power: both-and. Dohnanyi and the SPD intend to build Brokdorf and at the same time make nuclear power unnecessary.

On 14 occasions important people from politics and business had held negotiations about Hamburg's future energy concept. Then, on Tuesday of last week, Mayor Klaus von Dohnanyi (SPD) and Hans Werner Oberlack, board chairman of the Hamburg Electricity Works (HEW), announced a twofold decision:
--Hamburg and the HEW will continue joint construction of the Brokdorf nuclear power plant on the lower Elbe River in order, according to the planning, to be able to draw nuclear power from the 1,300 megawatt reactor starting in 1987.
--Hamburg and the HEW, however, will aslo build several coal-fired power plants in the Hanseatic city (which are supposed to heat 330,000 dwellings on the principle of the cogenerator) in order to make nuclear power unnecessary and to make it possible to extricate themselves from Brokdorf.

The mayor celebrated the "spectacular result of negotiations" with the HEW as a "classical reform decision" which "no one at all thought possible"--no doubt because hardly anyone really had wanted to have it that way.

The HEW did not want the coal-fired power plants because for years the company has been rigorously pressing forward with the expansion of nuclear energy and with Brokdorf would be able to meet up to over 70 percent of Hamburg's daily power needs from nuclear reactors. Share of nuclear power in the country as a whole: 14 percent.

The majority of the Hamburg SPD, and with it most of the Social Democrats of the North German Laender, did not want Brokdorf because they reject the enormous dependence on the nuclear fuel uranium and in its place advocate energy savings and the use of coal.

Thanks to Dohnanyi, Hamburg will soon have both--power from the Stade, Brunsbuettel, Kruemmel (from 1983 on) and Brokdorf nuclear power plants and energy from new coal-fired power plants. The key factor in the twofold decision: For generating electricity an excess capacity is being created which can then be dispensed with by getting out of Brokdorf.

The mayor's "very clear solution" has confused his own camp and that of the opposition. The decision whether to start now to get out of Brokdorf or to stick to the project has once again been postponed. And after the announcement of the decision it was by no means clear whether this has now become the "start of getting out" as Hamburg SPD chairman Joerg Koenig interpreted it, or "a getting out of the getting out" as DIE WELT commented. The leading Hamburg Social Democrats and the managers of the power conglomerate hope to have achieved at least one thing with the compromise: an easing of the emotion-laden political conflict which for years has been dividing advocates and opponents of nuclear power and which for the SPD turned into an explosive charge.

Yet the "third way out" (SUEDDEUTSCHE ZEITUNG), which was chosen with tactical skill, might also cause the opposite. Headlines in Springer's HAMBURGER ABENDBLATT: "Brokdorf--SPD At Odds Again."

Because Brokdorf, like no other nuclear power plant installation, has been the focal point of innumerable demonstrations and violent confrontations since the start of construction in 1976; the large construction project was the target of legal quarrels and political disputes, as well. Advocates and opponents elevated the nuclear plant in the Wilst Marsch to a symbol for and against utilizing nuclear energy.

The quarrel progressed on opposite fronts; North German Social and Free Democrats opposed the nuclear power advocates in the Kiel CDU Land government- and in the Bonn Social-Liberal coalition, led by Chancellor Helmut Schmidt and Minister for Ecomonics Otto "Count Brokdorf." Individual trade unions voted for and against the reactor, and almost any means of providing Brokdorf a brilliant future seemed justified to the nuclear lobby from business and industry.

The policy chalked up a list of prominent victims in the nuclear conflict: Schleswig-Holsteins' SPD opposition leader Klaus Matthiesen renounced the leading candidacy for the Landtag campaign in 1983 in Schleswig-Holstein because Chancellor Schmidt openly supported the pro-Brokdorf course of the Kiel CDU government. Dohnanyi's predecessor, Hans-Ulrich Klose, stepped down as mayor 11 months ago because the Hamburg Land SPD board and the SPD City Parliament fraction, contrary to resolutions by party meetings and the Senat, denied him support.

The HEW, the union of power companies and the nuclear power industry assumed a special role in the move. The monopoly enterprise strictly refused to change the policy (get out of Brokdorf) which had been decided by its majority stockholder.*

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*Hamburg holds 72 percent of the HEW stock. The rest, including 6,000 HEW employee shares, is distributed among 30,000 private stockholders.

Executive board and board of trustees, on which right-wing comrades keep company with representatives of the CDU, the energy industry and the HEW staff for Brokdorf, determine the manner and scope of Hamburg's energy policy. And this nuclear tangle over Hamburg has thus far resulted in the fact that the HEW, in spite of or because of its high share of nuclear energy, has the second highest electricity prices among the 50 most important West German electricity works.

Thus, it signifies a course correction that Dohnanyi, by means of an adroit way of negotiating, committed the HEW in a "threatening embrace" to build new coal-fired power plants and to press forward with the expansion of overland heating (from 195,000 to 330,000 housing units). In any event, the HEW's existing coal-fired power plants are in need of renovation sooner or later and belch tons of dust and sulfur gases into the atmosphere from their smokestacks.

With the planned cogenerator the new power plants will simultaneously meet several goals relating to energy, environment and labor market policy: the fuel used will be utilized to a far higher degree than in the case of straight power production. Exhaust heat will no longer heat up the atmosphere or the Elbe, but swellings. Hamburg's air will at least become a bit cleaner because modern filters will decrease emissions and thousands of individual furnaces will become unnecessary; in addition, power plant and overland heating construction promises roughly 1,500 jobs in the next few years.

To be sure, whether the energy concept will be implementable in the way that was decided is doubted even by Social Democrat city hall politicians: "That's a likely story."

The involvement in Brokdorf will probably cost the HEW DM2.5 billion, the coal-fired overland heating program at least DM3 billion, and the opposition to the new coal-fired power plants is growing in the parts of the city affected.

A high level Hamburg comrade resigned himself in the following way: "How, after the Brokdorf decision, are we now going to explain to our citizens that they will have to live with a coal-fired power plant outside their front door." And the decision is certainly of no help for parts of the SPD base which just weeks before the Hamburg City Parliament election on 6 June are supposed to explain Dohnanyi's Brokdorf concept to the citizens.

In the election platform recently published by the SPD, the turning away from Brokdorf is justified without any "ifs" or "buts," now the line is rather running in the way put forth by SPD chairman Willy Brandt as an energy guideline: a "decisive both-and."

12124
CSO: 5100/2157

'MILLIYET' COLUMNIST DISCUSSES 'MUSLIM' ATOMIC BOMB

Istanbul MILLIYET in Turkish 3 Apr 82 p 3

[Article by Attila Ilhan in the column "Directly": "Muslim Atomic Bomb"]

[Text] Zulfikar Ali Bhutto got in trouble over this as early as 1976. On 30 October of that year, he said:

"While the Israeli, South African and Indian unlimited nuclear programs are not considered an 'incident,' a big deal is being made of our program, and this is an alarming commentary on the views which do not outwardly deny the thing called 'worth'.... Is it possible to claim that discrimination is not being practiced? Does it prove that the nuclear monopoly of the Western powers is being used on behalf of peace and balance? There are many other non-nuclear states besides Pakistan which would be happy if they felt secure in this regard."

Bhutto reached agreement with France for an atomic powerplant and with Germany for an atomic reactor and heavy water facility; he was accused by the "system" of wanting to have the bomb. Although he was supported by the large majority of the Pakistani people, he not only fell from power, but was hanged.

That's one.

"Osirak" Adventure

Saddam Husayn, in a statement to the Lebanese magazine AL-USUL AL-'ARABI as early as September 1975, announced that he wanted Iraq to be the first Arab nation to have atomic weapons "against the Zionist threat."

Iraq reached agreement with France. It would buy a nuclear reactor called "Osirak"! Osirak fuel is the 93-percent enriched uranium from which the atomic bomb can easily be manufactured. Not content with this, moreover, Iraq wanted four lots of fuel at once, of 65 kilograms of enriched uranium. According to the experts, this would easily allow it to build an atomic bomb in 4-5 years. The Osirak agreement was concluded in 1976 for delivery on 9 April 1979.

Four days before delivery, the two reactors, ready for shipment to Iraq and under close guard in the nuclear hangar, were blown up "by unknonw persons." France got the reactors repaired and delivered them to the Iraqis. In June

1980, the Iraqi physicist Yahya al-Mashad, who had gone to Paris to take delivery of the first batch of uranium 235, was killed "by unknown persons." The Shiite rebellion against the Iraqi regime had begun in 1979. Shortly after the Osirak was installed, on 7 June 1981, as we all remember, it was destroyed by bombs dropped from Israeli aircraft.

That's two.

"System's" Nightmare

What bothers the Islamic nations is this:

"Israel and South Africa have a nuclear capability. That's the Christians, the Jews and the Hindus. Likewise the communist nations. Only the Muslim world lacks nuclear capability."

Qadhdhafi is said to have first conceived the Islamic atomic bomb. Muhammad Haykal, the newspaperman who was an intimate of Nasir's, revealed in his memoirs that he put forward in talks with the "Chief" the need for the bomb to finish the Israeli business. It was also he who later gave Bhutto and Pakistan moral and material support. The Iraqi plan, however, was aided by Saudi Arabia, and probably still is: It was Saudi Arabia that ordered from France the duplicate of the reactor destroyed by Israel. The powerplant would be built in Iraq and Saudi Arabia would pay for it. France could not renege on the order because it gets 73 percent of its oil from these two countries. Yet it was heavily pressured by the "system." They do not want a Muslim nation in the gulf region to acquire nuclear arms.

Two New York TIMES reporters, Steve Weissman and Herbert Krosney, left their jobs and spent 18 months on a world tour, compiling a report on the "Muslim bomb." The book was published in America. The gist of it was to accuse France of arming the Muslims with the bomb against the West, as this is the conclusion they reached: At least one Muslim nation may now be considered to have a nuclear capability. But which one? Pakistan? Iraq? Iran? Saudi Arabia? Libya? Syria?

In February 1979 (I was writing in the newspaper DUNYA then), I published two articles. Would you like to hear the name of one of them? Here it is: "System's Nightmare: Muslim Atomic Bomb." [I said] The West is gambling on Israel and Greece in the Middle East (Egypt later joined). It will not do for anyone other than close friends to have nuclear power. Should it become necessary to intervene in the region, the possibility of the Muslim nations' defending themselves with nuclear weapons scares them. Yet, as known, the gulf nations proposed and adopted the principle that the regional nations resolve the problem among themselves. In this case, they have to have a "deterrent" against the "sirens' songs from outside."

To have a "deterrent" is possible only by having "deterrent" weapons.

Do You Wonder

Are you wondering what the title was of that other article I wrote in February 1979? Very well, let me tell you: "We Must Produce Our Own National Atomic Bomb." Really!

8349
CSO: 5100/5302

END

JPRS 81117

23 June 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 149

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JPRS 81117

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WORLDWIDE REPORT

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INTERREGIONAL URANIUM EXPLORATION MEETING HELD IN MADAGASCAR

Tananarive MADAGASCAR-MATIN in French 20 Apr 82 pp 1-2

[Text] An interregional uranium exploration meeting, which opened yesterday and continues through 28 May 1982, is being held successively in Tananarive, Fort-Dauphin and Antsirabe.

Delegates from Afghanistan, Ivory Coast, Egypt, Indonesia, Cameroon, Yugoslavia, Romania, Tunisia, Niger, Vietnam, Mali, Gabon, Algeria, Morocco, Argentina, Poland, Canada, Great Britain, Libya, France, Austria and, of course, Madagascar are participating in this meeting, which opened officially yesterday morning in the Madagascar-Hilton Hotel. Among the attendees were Mr Stipanicic, representative of the director general of the International Atomic Energy Agency [IAEA], headquartered in Vienna, Austria; Col Humbert Andrianasolo-Ralamiza, director general of the National Military Office for Strategic Industries (OMNIS); and Mr Teunissen, resident UN representative in Tananarive. Also present were representatives of the diplomatic corps (U.S.A., European Development Fund, Algeria, Central Fund for Economic Cooperation and Yugoslavia).

Eagerness

Let us take note of the fact that this meeting was jointly organized by the Democratic Republic of Madagascar (through OMNIS) and IAEA. Madagascar, by consenting to hold such a meeting in its country, once again demonstrated its eagerness to work for world development. As so brilliantly underscored yesterday by Col Hubert Andrianasolo, uranium is being called upon to constitute the third industrial revolution. And it is known that our substrata contain this precious ore. In his speech, Stipanicic emphasized in particular the full readiness of his agency to assist all countries that have uranium ore to mine it efficiently, especially developing countries. To this end, the agency makes available to them experts, equipment, foreign scholarships and, as at present, on-site training courses. Nuclear energy in the service of peace and development was also the backdrop for the brief speech delivered on this occasion by Stipanicic.

As we have stated, Col Humbert Andrianasolo's speech yesterday was noteworthy, principally as regards the role of "nuclear energy" in the life of man from now to the end of the 20th century. Therefore, the holding of this meeting in Madagascar, as it was put by the director general of OMNIS, in the "crowning achievement of the patient efforts that have permitted us to make known the important role that the Democratic Republic of Madagascar can play in the concert of nations for the development of nuclear science and, most particularly, nuclear energy. The universality of assistance, the quality and high competence of the participants and conferees cannot fail to encourage us in our effort and prompt us "to forge even further ahead."

Last Quarter of the Century

Yesterday the principal topic was the "nuclear source of energy." In this last quarter of the 20th century, "nuclear energy" is to occupy a preferred position in mining, agricultural and medical research and the supply of energy. As we all know, the first "industrial revolution" was the result of coal, the second derived from oil and hydroelectricity with the possibility of widespread electrification. We are increasingly of the opinion that the "third revolution" before the end of this century will be produced by nuclear energy. Thus, Col Hubert Andrianasolo-Ralaimiza very properly said yesterday that the development of energy sources is a "development-generating industry because it is an industrializing industry."

He gave particular emphasis to the even greater importance of energy in the developing countries. There is no need to comment on this point; it is public, indeed international, knowledge. However, the figures cited by the director general of OMNIS are mind-boggling just the same. And it would be good to take note of them. Most of the world's energy production is consumed by the developed countries. Representing only 30 percent of world population, these countries now consume over 80 percent of the world's commercial energy, while 70 percent of the world's population living in the developing countries consume less than 20 percent. Other figures cited: the needs of the developing countries in the implementation of the necessary energy infrastructure are estimated at over US $800 billion.

Efficiency

Nevertheless, when the developing countries have energy available, they must use their resources efficiently. The problems of the developed countries are not the same because they have the financial and technological resources. This leads to the construction of nuclear power plants here and there in those self-same developed countries. This regardless of the danger to which they are exposing themselves (possible diversion of raw materials for military or terrorist purposes, risks of radioactive fallout...)

The Third World, of course, has not reached that point. But once developed efficiently, the uranium found in these very countries is destined to positively "revolutionize" their economic and social situation, which today is generally precarious.

As for Madagascar specifically, in 1922 a great French minerologist, Alfred Lacroix, published a memorable book on the mineralogy of Madagascar and revealed to the world the potential contained in the Malagasy substrata. After years of effort, interrupted by World War II, on 5 February 1953 the first "uranium leaching plant" of what at that time was called the French Union was opened in Madagascar. Marcel Roubault, chairman of the Mines Committee of the Atomic Energy Commission (CEA), who came to Madagascar on that occasion, said: "The peaceful use of atomic energy will certainly be perfected in 10 years, at which time a kilogram of uranium will replace 10 tons of coal. Atomic energy will be for these overseas territories an incomparable means of development." Although his estimate for a kilogram of uranium has been largely exceeded, on the other hand the second part of his forecast remains to be realized.

Uranium and Oil

That is why President Didier Ratsiraka has now placed the development of Malagasy uranium among his so-called "presidential" projects. Where? When? How? An ideal opportunity is now present to speak of this publicly. We intend to return to this topic.

In the world, the idea is spreading that uranium can take care of the post-oil period. We have uranium. Oil? There is more and more talk of developing the sandstone of Bemolanga. And conventional oil, too. Heavy drilling equipment for this purpose from the American Mobil Oil Company arrived in Toamasina last week and will gradually be sent to the site. In other words, Madagascar's future looks bright. While we await an international meeting of the kind being held now, this interregional uranium exploration meeting (OMNIS-IAEA) will help us to better prepare for that future!

8143
CSO: 5100/5650

FINLAND STUDYING PURCHASE OF REACTOR FROM USSR OR FRANCE

Helsinki HELSINGIN SANOMAT in Finnish 30 Apr 82 p 22

[Text] In case nuclear power is chosen as a future power source in Finland, Imatran Voima is, according to managing director Pentti Alajoki, more interested in an alternative consisting of two units of the present kind, rather than a large 1,000-megawatt power plant.

Alajoki predicts that the decision to order or not to order nuclear reactors will not be made until after the fall parliamentary elections. Alajoki assumes that the results of the current studies will not be made public before the elections.

Imatran Voima has contracts for suitability tests of nuclear reactors with both Soviet and French suppliers. The studies are to be completed by the fall.

The alternatives for Finland's nuclear reactor that have been presented are either two 500-megawatt reactors or one 1,000-megawatt reactor. Alajoki states that the latter still involves certain "crucial questions" that it might be hard to reach mutual agreement about with the authorities who control the reactors.

In regard to the safety standards of the French reactors, Alajoki is of the opinion that these are somewhat lower than what is required in Finland. This may weaken their chances when the choice is made.

The possibilities that the French suppliers present for the storage of spent fuel would not be as extensive, for example, as the current practice at the Imatran Voima plants, from which spent fuel is transported to the Soviet Union. The French offer the possibility of storing the spent fuel for only a limited period.

According to Alajoki, there is reason to not completely forget the Swedish alternative.

By current estimates, Finland will need an increased capacity for electricity production by the early 1990's. It is necessary, because of the long construction time, to decide within a year whether or not this energy should be produced with nuclear power. Among the alternatives to nuclear power, the construction of a large coal plant is also being studied.

9662
CSO: 5100/2160

UNION ANTI-NUCLEAR POLICIES SPREAD TO INCLUDE U.S. WARSHIPS

Brisbane Activities

Brisbane THE COURIER-MAIL in English 24 Apr 82 p 4

> [Text] Queensland Trades and Labor Council unions will call a 24-hour protest strike when the American nuclear warship Truxtun berths in Brisbane.

The ship's expected arrival in Queensland waters next Thursday will trigger off action by all unions in the Brisbane metropolitan area able to take part in the strike.

All commuter transport, telephone repairs, garbage collection and a wide variety of other services could be affected.

Essential services will be exempt, but the Trades and Labor Council does not view public transport as an essential service.

As the Australian Railways Union--the union with the most members and widest coverage in the railway system--has a strong anti-uranium policy, it is expected to halt rail services for the 24 hours.

The Australian Telecommunication Employees Association also has an active anti-uranium and anti-nuclear policy which means its members also are strong contenders to join the stoppage.

All other TLC unions have policies which oppose uranium mining, uranium enrichment and nuclear power.

The Queensland Trades and Labor Council secretary Mr Whitby, said the unions decided yesterday morning to hold the stoppage and place Fisherman Islands--at the mouth of the Brisbane River, where the ship will berth--out of bounds during its visit.

"The nature of the recommendation will not be announced prior to the mass meeting," he said. "It was also reported that the Brisbane branch of the Waterside Workers Federation has decided to hold a 24-hour stoppage and no work will be performed in the vicinity of the Truxtun."

He said: "The Waterside Workers' Federation will announce the date of the 24-hour stoppage as soon as it has been fixed.

"This ship is now expected to arrive next Thursday, and because of its size will have to come in on the high tide. It is expected to be in Brisbane for up to nine days."

The unions would also be demonstrating their antagonism to the Truxtun's presence with placards during the Labor Day procession.

Mr Whitby said that what the unions wanted was for members to await the announcement of the date the Truxtun would arrive and then organise all protest stoppages to go off simultaneously.

A Peace Force researcher, Mr Mark Hayes, said the Truxtun's visit to Brisbane next week should be the cause of great concern.

"If it were a Soviet warship, a British warship or anybody else's warship, Peace Force's opposition would be exactly the same.

"In line with peaceful people throughout the world, and particularly the Pacific Ocean, we are opposed to this terrible nuclear arms race of death.

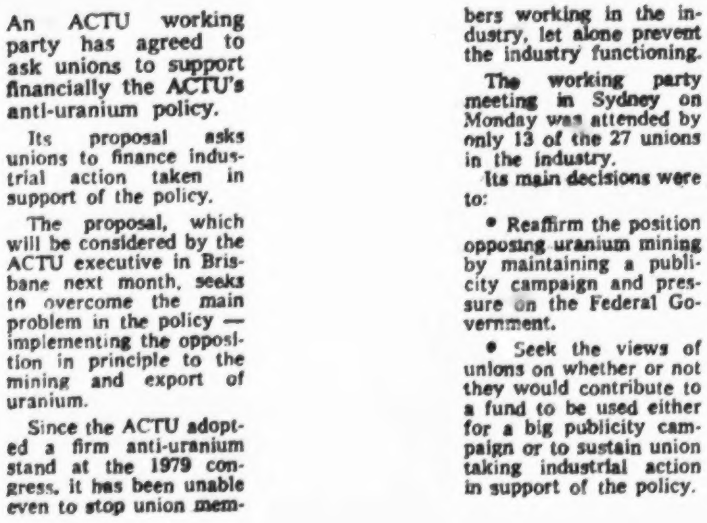
"Peace Force will organise a number of peaceful non-violent and lawful protests to the Truxtun's visit," he said.

Plea for Financial Support

Melbourne THE AGE in English 29 Apr 82 p 6

[Article by Peter Stephens]

[Text]



An ACTU working party has agreed to ask unions to support financially the ACTU's anti-uranium policy.

Its proposal asks unions to finance industrial action taken in support of the policy.

The proposal, which will be considered by the ACTU executive in Brisbane next month, seeks to overcome the main problem in the policy — implementing the opposition in principle to the mining and export of uranium.

Since the ACTU adopted a firm anti-uranium stand at the 1979 congress, it has been unable even to stop union members working in the industry, let alone prevent the industry functioning.

The working party meeting in Sydney on Monday was attended by only 13 of the 27 unions in the industry.

Its main decisions were to:

- Reaffirm the position opposing uranium mining by maintaining a publicity campaign and pressure on the Federal Government.
- Seek the views of unions on whether or not they would contribute to a fund to be used either for a big publicity campaign or to sustain union taking industrial action in support of the policy.

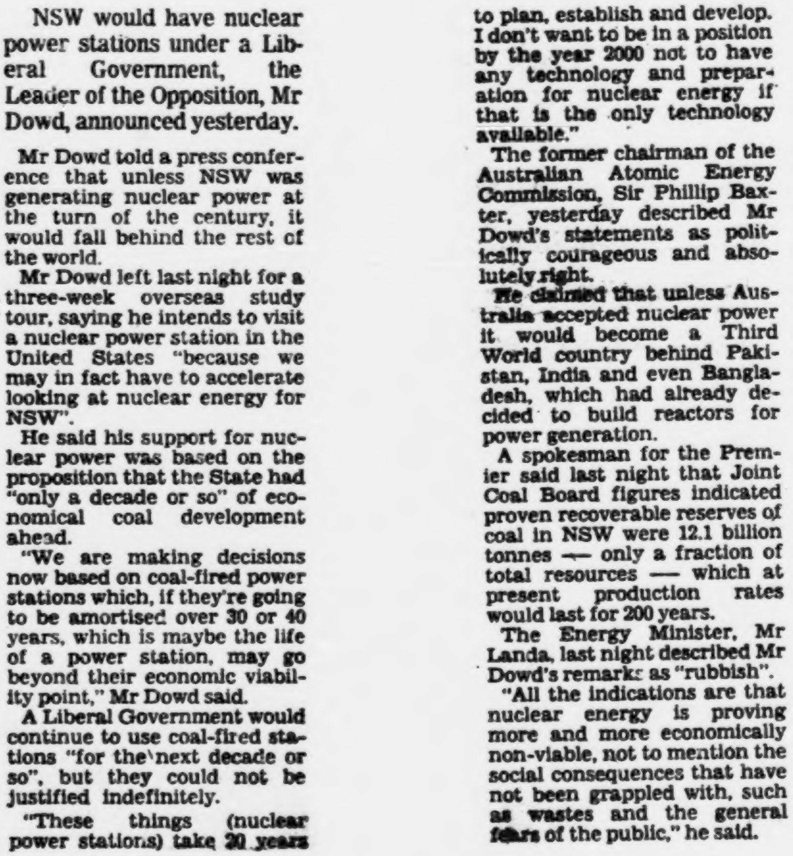
CSO: 5100/7531

NEW LIBERAL OPPOSITION LEADER SUPPORTS NUCLEAR POWER

Canberra THE AUSTRALIAN in English 22 Apr 82 p 1

[Article by Jivan Prabhakar: "Dowd Pledges Nuclear Power for NSW"]

[Text]



NSW would have nuclear power stations under a Liberal Government, the Leader of the Opposition, Mr Dowd, announced yesterday.

Mr Dowd told a press conference that unless NSW was generating nuclear power at the turn of the century, it would fall behind the rest of the world.

Mr Dowd left last night for a three-week overseas study tour, saying he intends to visit a nuclear power station in the United States "because we may in fact have to accelerate looking at nuclear energy for NSW".

He said his support for nuclear power was based on the proposition that the State had "only a decade or so" of economical coal development ahead.

"We are making decisions now based on coal-fired power stations which, if they're going to be amortised over 30 or 40 years, which is maybe the life of a power station, may go beyond their economic viability point," Mr Dowd said.

A Liberal Government would continue to use coal-fired stations "for the next decade or so", but they could not be justified indefinitely.

"These things (nuclear power stations) take 20 years to plan, establish and develop. I don't want to be in a position by the year 2000 not to have any technology and preparation for nuclear energy if that is the only technology available."

The former chairman of the Australian Atomic Energy Commission, Sir Phillip Baxter, yesterday described Mr Dowd's statements as politically courageous and absolutely right.

He claimed that unless Australia accepted nuclear power it would become a Third World country behind Pakistan, India and even Bangladesh, which had already decided to build reactors for power generation.

A spokesman for the Premier said last night that Joint Coal Board figures indicated proven recoverable reserves of coal in NSW were 12.1 billion tonnes — only a fraction of total resources — which at present production rates would last for 200 years.

The Energy Minister, Mr Landa, last night described Mr Dowd's remarks as "rubbish".

"All the indications are that nuclear energy is proving more and more economically non-viable, not to mention the social consequences that have not been grappled with, such as wastes and the general fears of the public," he said.

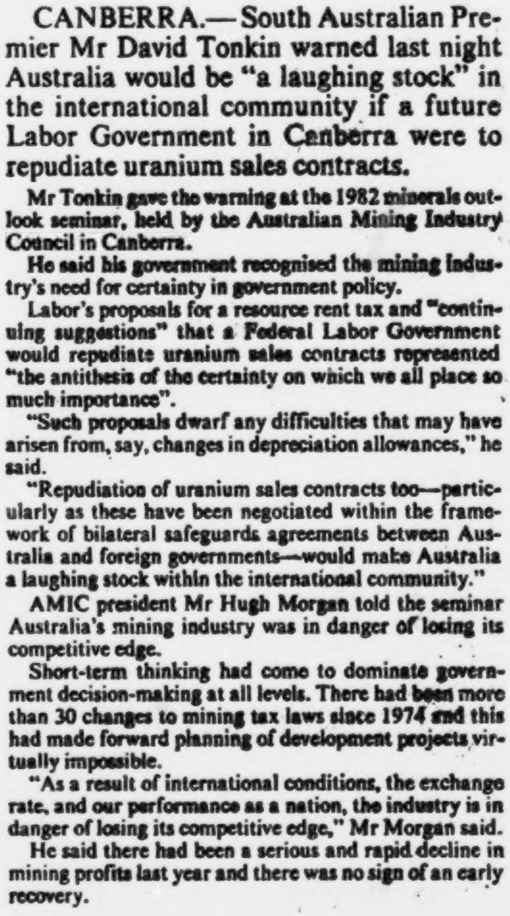
CSO: 5100/7531

AUSTRALIA

SA PREMIER HITS LABOR PARTY THREAT TO URANIUM INDUSTRY

Brisbane THE COURIER-MAIL in English 5 May 82 p 32

[Text]



CANBERRA.—South Australian Premier Mr David Tonkin warned last night Australia would be "a laughing stock" in the international community if a future Labor Government in Canberra were to repudiate uranium sales contracts.

Mr Tonkin gave the warning at the 1982 minerals outlook seminar, held by the Australian Mining Industry Council in Canberra.

He said his government recognised the mining industry's need for certainty in government policy.

Labor's proposals for a resource rent tax and "continuing suggestions" that a Federal Labor Government would repudiate uranium sales contracts represented "the antithesis of the certainty on which we all place so much importance".

"Such proposals dwarf any difficulties that may have arisen from, say, changes in depreciation allowances," he said.

"Repudiation of uranium sales contracts too—particularly as these have been negotiated within the framework of bilateral safeguards agreements between Australia and foreign governments—would make Australia a laughing stock within the international community."

AMIC president Mr Hugh Morgan told the seminar Australia's mining industry was in danger of losing its competitive edge.

Short-term thinking had come to dominate government decision-making at all levels. There had been more than 30 changes to mining tax laws since 1974 and this had made forward planning of development projects virtually impossible.

"As a result of international conditions, the exchange rate, and our performance as a nation, the industry is in danger of losing its competitive edge," Mr Morgan said.

He said there had been a serious and rapid decline in mining profits last year and there was no sign of an early recovery.

CSO: 5100/7532

LABOR GOVERNMENT COULD HALT URANIUM MINING WITHOUT COMPENSATION

Brisbane THE COURIER-MAIL in English 8 May 82 p 3

[Text] **A federal Labor government would have the power to halt uranium mining and export without paying compensation to mining companies.**

This advice was given in a specially commissioned legal report presented to the party's national executive yesterday.

The advice, presented by the party's legal and constitutional committee and based on the opinion of constitutional and mining law experts, appears to give the Labor Party solid legal backing to implement its anti-uranium policy.

The Opposition spokesman for justice Senator Gareth Evans told the national executive meeting in Sydney a Labor government could terminate uranium agreements without being liable for compensation under Australian or international law.

Mr Hawke, when president of the Australian Council of Trade Unions, favored a policy of permitting uranium development. He said any other policy was unrealistic.

However, the announcement yesterday was welcomed by his ACTU successor, Mr Cliff Dolan who is the leader or trade union opposition to uranium development.

Mr Dolan described the report last night as "very significant and heartening news."

"The ALP policy is very similar to ACTU policy in that it called for a complete moratorium of uranium mining and we would have expected that a Labor government next year would at least refuse any further export licences for any future mines.

"If they can stop present mines operating without being required to pay compensation, well that is very heartening indeed."

Labor's national secretary Mr Bob McMullan said the executive accepted the committee's report as being legally valid.

He said the executive had established a sub-committee to review the social, economic and financial implications of the ALP's uranium policy.

The sub-committee would report to the next executive meeting in July prior to the national conference which determined party policy, he said.

The sub-committee was composed of the national officers, the leader and deputy leader and the secretaries of the Victorian and NSW branches.

Mr Dolan and the ACTU secretary, Mr Peter Nolan, would be asked to join the committee.

Mr McMullan said the committee could not make policy recommendations.

The executive also resolved that the next senior vacancy in the party's national secretariat would be filled by a woman.

Mr McMullan said that following a state branch review the executive resolved that it could not at present fund the position of a female assistant national secretary.

But the executive had adopted a recommendation from the national status of women policy committee that a woman be appointed to the next senior secretariat position which became vacant.

He said it was certain that this would happen this year and would coincide with a general staff review of the secretariat.

CSO: 5100/7532

BRIEFS

FREMANTLE NUCLEAR PROTEST--Fremantle will be the centre of a demonstration against nuclear power today--three days after signs were erected on the city boundaries declaring it a nuclear free zone. The Campaign Against Nuclear Energy will hold a peaceful protest outside the Fremantle town hall over a visit by the commander in chief of the American Pacific fleet, Admiral James Watkins. Admiral Watkins will attend a council reception as part of his visit to WA to commemorate the Battle of the Coral Sea. At least one Fremantle councillor will be among the protesters outside the hall. Cr Gerry MacGill said yesterday that he would attend the demonstration as a private individual to show his concern at the presence of nuclear-armed vessels in the Indian Ocean. [Perth THE WEST AUSTRALIAN in English 4 May 82 p 34]

ANTINUCLEAR PETITION--Almost 400,000 Australians have signed a petition calling for the abolition of nuclear weapons. This was announced at a ceremony at Parliament House, Canberra, yesterday by the president of the United Nations Association of Australia, Mrs Cecile Storey. She said an overwhelming number of people wanted to abolish nuclear weapons and all weapons of mass destruction. "Australians also want world-wide conventional weapon disarmament in stages," she said. Mrs Storey was announcing the results of the World Disarmament Campaign Petition, sponsored by the association. She said 376,427 people had signed the petition, which would be presented, with millions of signatures from all over the world, to the Second United Nations Special Session on Disarmament in New York on June 10. The petition was addressed to all governments and the UN special session. Its four points were agreed to by all nations, including Australia, at the first UN Special Session on Disarmament in 1978. They call for the abolition of nuclear weapons and all weapons of mass destruction. [Canberra THE AUSTRALIAN in English 5 May 82 p 2]

CALL FOR N-POWER REJECTION--CANBERRA--The Opposition called yesterday for a Federal Government commitment that nuclear power was not being considered as a serious option for power-generation in Australia. Labor's environment and conservation spokesman, Mr West, asked the Prime Minister, Mr Fraser, for the statement following the release of the national energy advisory committee report "Nuclear power in Australia: regulation and control." "Does it suggest that nuclear power is an energy option for South Australia, Western Australia, Tasmania and the Northern Territory?" Mr West asked. Mr Fraser said talks were under way aimed at getting a uniform code, but there was no proposal before the government. He said there had been an earlier proposal by Western Australia for a possible nuclear powerstation by 1990-95. [Brisbane THE COURIER-MAIL in English 7 May 82 p 10]

RANGER URANIUM OUTPUT--Energy Resources of Australia Ltd's Ranger uranium project at Jabiru operated at about 95 per cent of stated capacity in the March quarter with an output of 715.7 tonnes of uranium oxide. The output was 61.1 tonnes down on December quarter production of 776.8 tonnes--representing more than 103 per cent of capacity--but ERA is still confident that the 1982 target of 3,000 tonnes will be reached. "We are now back on plan with output running at slightly above rated capacity," a spokesman said yesterday. The Ranger project "drummed" its first uranium oxide product on August 13 last year and by the end of 1981 had produced 1,122.2 tonnes. Output up to the end of March of 1,837.9 tonnes should be lifted to at least 2,600 tonnes for the company's first year of operation ending on June 30. In its December half-year, it reported a net profit of $7.73 million on sales of $36.6 million. [By J.N. Pierce] [Text] [Sydney THE SYDNEY MORNING HERALD in English 21 Apr 82 p 26]

URANIUM MINE SHUTDOWN--Melbourne.--The board of Mary Kathleen Uranium expects the company, for a long time Australia's only uranium producer, to be wound up before the end of 1983, it announced yesterday. The chairman of MKU, Mr J.L. Liebelt, told yesterday's annual meeting that directors expected the company to be wound up when sales commitments and rehabilitation of the mine site was completed. Once plant and equipment had been sold and the cost of rehabilitation more accurately assessed, consideration would be given to a partial return of capital before the company was wound up. Mr Liebelt said the low grade of the MKU deposit made it costly to produce uranium oxide. Together with the weak uranium market, this made operations uneconomic. Despite spending about $15 million in 1982 dollars the company had been unable to locate any extension to the MKU ore and no discoveries had been made outside Mary Kathleen. All exploration activity by the company had been discontinued, he said. Mr Liebelt said production for 1982 was expected to be slightly higher than in 1981, with sales lower. By the end of the year stocks should be sufficient to cover remaining sales commitments due for delivery in 1983 and 1984, he said. [By Stephen Bartholomeusz] [Excerpts] [Sydney THE SYDNEY MORNING HERALD in English 24 Apr 82 p 32]

CSO: 5100/7531

MARTIAL LAW OFFICIAL ADDRESSES ATOMIC ENERGY COMMISSION

Dacca THE NEW NATION in English 13 May 82 pp 1, 8

[Text] Air Vice-Marshal Sultan Mahmud, Deputy Chief Martial Law Administrator and Adviser for Energy and Mineral Resources yesterday stressed the importance of people-oriented research by peaceful uses of the atomic energy, reports BSS.

Addressing the scientists and officials of the Bangladesh Atomic Energy Commission here, the DCMLA called upon the scientists to innovate newer ways to utilise the nuclear power in the field of applied science for the benefit of the commonmen.

Air Vice-Marshal Sultan Mahmud visited the Atomic Energy Commission compound and went round the different laboratories and other sections of the Commission. The Chairman of the Commission Dr. Anwar Hossain and senior officials were present on the occasion.

Describing electricity as an essential pre-requisite for any industrial development, the DCMLA said that the deficiency of power particularly in the Western Grid had put up enormous obstacles in agriculture, industry and other sectors. He said that the present government was undertaking various measures to enhance production of electricity. He also disclosed that a final decision would be taken soon in respect of the Rooppur Nuclear Power Project.

Air Vice-Marshal Sultan expressed satisfaction at the progress of work on the 3-mw Research Reactor at Savar near Dacca. He appreciated the achievements attained by the Commission in the field of food storage, medicine sterilisation, disease detection, training in advanced computer and establishment of an electronic institute in the country.

The DCMLA urged the scientists and researchers to concentrate more on application of science for the benefit of commonmen. He abvised them to give priority on such research projects which would give immediate return and would benefit larger number of people.

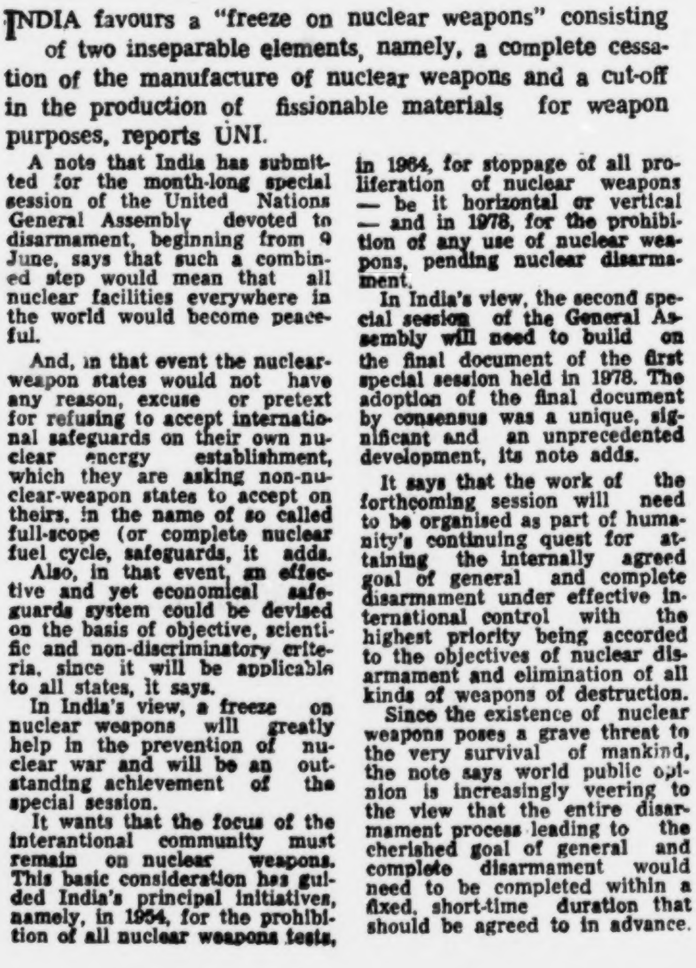
The Adviser for Energy said that the government was determined to remove the impediments on the way of adopting a proper administrative policy in respect of research work. He expressed his keen interest to exchange views on proper utilisation of science and technology for quick economic development of the country.

CSO: 5100/7098

NOTE TO UN DISARMAMENT SESSION FAVORS NUCLEAR FREEZE

New Delhi PATRIOT in English 20 May 82 p 7

[Text]



INDIA favours a "freeze on nuclear weapons" consisting of two inseparable elements, namely, a complete cessation of the manufacture of nuclear weapons and a cut-off in the production of fissionable materials for weapon purposes, reports UNI.

A note that India has submitted for the month-long special session of the United Nations General Assembly devoted to disarmament, beginning from 9 June, says that such a combined step would mean that all nuclear facilities everywhere in the world would become peaceful.

And, in that event the nuclear-weapon states would not have any reason, excuse or pretext for refusing to accept international safeguards on their own nuclear energy establishment, which they are asking non-nuclear-weapon states to accept on theirs, in the name of so called full-scope (or complete nuclear fuel cycle, safeguards, it adds.

Also, in that event, an effective and yet economical safeguards system could be devised on the basis of objective, scientific and non-discriminatory criteria, since it will be applicable to all states, it says.

In India's view, a freeze on nuclear weapons will greatly help in the prevention of nuclear war and will be an outstanding achievement of the special session.

It wants that the focus of the interantional community must remain on nuclear weapons. This basic consideration has guided India's principal initiatives, namely, in 1954, for the prohibition of all nuclear weapons tests, in 1964, for stoppage of all proliferation of nuclear weapons — be it horizontal or vertical — and in 1978, for the prohibition of any use of nuclear weapons, pending nuclear disarmament.

In India's view, the second special session of the General Assembly will need to build on the final document of the first special session held in 1978. The adoption of the final document by consensus was a unique, significant and an unprecedented development, its note adds.

It says that the work of the forthcoming session will need to be organised as part of humanity's continuing quest for attaining the internally agreed goal of general and complete disarmament under effective international control with the highest priority being accorded to the objectives of nuclear disarmament and elimination of all kinds of weapons of destruction.

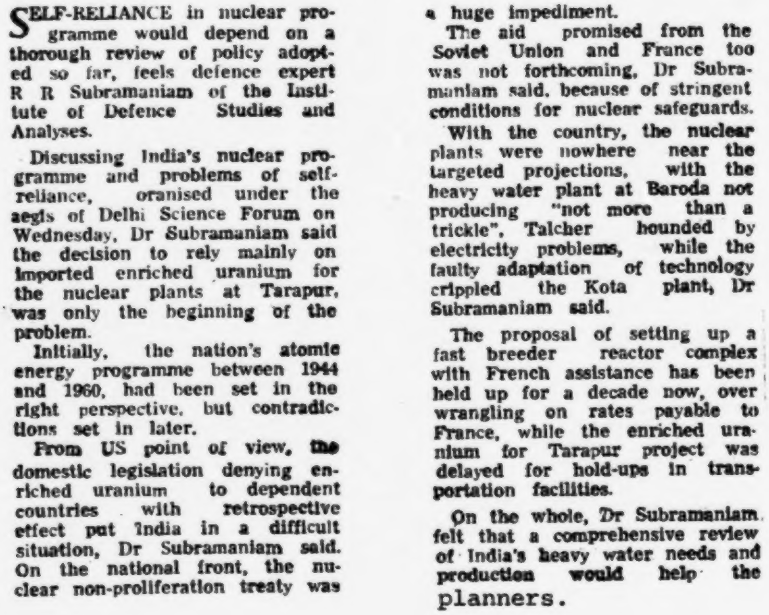
Since the existence of nuclear weapons poses a grave threat to the very survival of mankind, the note says world public opinion is increasingly veering to the view that the entire disarmament process leading to the cherished goal of general and complete disarmament would need to be completed within a fixed, short-time duration that should be agreed to in advance.

CSO: 5100/7097

DEFENSE EXPERT URGES NUCLEAR POLICY REVIEW

New Delhi PATRIOT in English 13 May 82 p 10

[Text]



SELF-RELIANCE in nuclear programme would depend on a thorough review of policy adopted so far, feels defence expert R R Subramaniam of the Institute of Defence Studies and Analyses.

Discussing India's nuclear programme and problems of self-reliance, oranised under the aegis of Delhi Science Forum on Wednesday, Dr Subramaniam said the decision to rely mainly on imported enriched uranium for the nuclear plants at Tarapur, was only the beginning of the problem.

Initially, the nation's atomic energy programme between 1944 and 1960, had been set in the right perspective, but contradictions set in later.

From US point of view, the domestic legislation denying enriched uranium to dependent countries with retrospective effect put India in a difficult situation, Dr Subramaniam said. On the national front, the nuclear non-proliferation treaty was a huge impediment.

The aid promised from the Soviet Union and France too was not forthcoming, Dr Subramaniam said, because of stringent conditions for nuclear safeguards.

With the country, the nuclear plants were nowhere near the targeted projections, with the heavy water plant at Baroda not producing "not more than a trickle", Talcher hounded by electricity problems, while the faulty adaptation of technology crippled the Kota plant, Dr Subramaniam said.

The proposal of setting up a fast breeder reactor complex with French assistance has been held up for a decade now, over wrangling on rates payable to France, while the enriched uranium for Tarapur project was delayed for hold-ups in transportation facilities.

On the whole, Dr Subramaniam felt that a comprehensive review of India's heavy water needs and production would help the planners.

CSO: 5100/7096

BRIEFS

'PEACEFUL PURPOSES' STAND REITERATED--ISLAMABAD, May 22--Pakistan's nuclear programme is peaceful and designed to help the economic development and well-being of the people. Commenting on the persistent Indian allegation that Pakistan wanted to develop nuclear capability to manufacture nuclear weapons, the knowledgeable sources pointed out that Pakistan has neither desire nor capability to manufacture nuclear weapons. It was also pointed out that Pakistan had taken a number of initiatives to remove fears, if any in this regard by offering India to have arrangements for bilateral or multilateral arrangements for inspection of nuclear facilities on reciprocal basis. Pakistan has also taken initiatives for the establishment of South-Aisa nuclear weapon free zone. The Indian allegation in this regard against Pakistan had obviously ulterior motives. [Karachi MORNING NEWS in English 23 May 82 p 1]

CSO: 5100/5667

NUCLEAR POWER DEVELOPMENT, PROBLEMS DESCRIBED

Zarnowiec Nuclear Power Plant

Opole TRYBUNA OPOLSKA in Polish 19-20 Mar 82 p 3

[Article by Przemyslaw Kuciewicz: "Poland's 'Nuclear' Start"]

[Text] After 10 years of preparations, a decision was made a couple of weeks ago to go ahead immediately with the building of Poland's first nuclear power plant. It will be built in Zarnowiec on the Gdansk Coast. One billion zlotys are going to be spent on this site. In the course of an 8-year investment cycle, construction will absorb 45 billion zlotys.

Many people ask the question whether it pays for us to undertake such a costly investment right now at the nadir of our crisis and with unhappy prospects for the immediate future. This may be answered with another question: Can we afford prolonging indefinitely our energy deficit; and with no prospects for the future and the future impossible to foresee, are we equal to the exigéncies of time? Furthermore, the way out of the crisis certainly is not going to be realized by abandoning all investments. This does not change the fact that the construction of the Zarnowiec nuclear power plant will be an important endeavor for our country. It is also a fact that this same result, i.e., an additional 1800 megawatts of power, could be attained more cheaply by building a comparable coal-fired electric power plant. This is true. But such a power plant would have to be supplied with over 5 million tons of coal annually. Though our coal reserves are not small, we cannot develop the coal-fired power industry forever. This coal has not only to be mined--it is getting to cost more and more--but it has to be transported. And in the case of Zarnowiec, all the way to other end of Poland.

Why Zarnowiec?

Why then the decision to have Poland's first "nuclear plant" built in Zarnowiec and not somewhere else? In the first place, it is a northern region with Gdansk as an urban center. This makes for all the greater the number of consumers of energy. While energy transmitted to Gdansk from central Poland causes losses of about 10 percent.

In the second place, the creation of a complex composed of two power plants has been planned a long time ago: A nuclear and pumped-storage electric power plant and a water-powered plant. Both of these would require an abundance of water--first, for cooling the turbines, second, for propelling them. Zarnowiec, as a projected site, situated on a large lake, fulfills these requirements perfectly. A pumped-storage electric power plant has been in existence for some time and is going to start supplying our country's grid in the first quarter of 1982. This power plant, however, will be fully effective only in tandem with a "nuclear power plant."

These then are the particular reasons for not delaying the decision to build the nuclear power plant. And we should get on with it before having completed work on the first part of the energy complex. Let us add that the building site, the equipment, and the cadre of construction power engineers are in place. Delaying this matter would seriously increase costs later on.

With a Friend's Help

Now let us pose still another question: Will we be able to build a nuclear power plant--do we have the available technological means and professional know-how to do something like this?

Although it does not take a genius to figure this out, it would be difficult for us to carry this out. Fortunately, we can take advantage of the Soviet Union's technical aid and wide experience. From it we receive, first of all, the basic installation--reactors. There will be four reactors of the WWR [pressurized water reactor] type with a unit power of 465 megawatts, just like the ones already in use in the USSR, Bulgaria, Czechoslovakia and those just now being installed in Hungary.

Our country's producers are supplying a significant majority of the remaining equipment (60 percent of the whole). The most important among this type of equipment would be the heat exchangers produced by "FAKOP," the industrial boiler factory in Sosnowiec. Let us add that we also export these kinds of equipment to the Soviet Union on the basis of shared work within the framework of CEMA. Among the suppliers of nuclear investment will be found "ZAMECH" Gen Karol Swierczewski Mechanical Plants at Elblaq, a producer of turbines among other things. In the first phase of construction up to the year 1985, no free-foreign exchange imports are anticipated. We will see what happens later on. At any rate, we are taking pains so as to manage the best way we know how with what we have.

Failure--Once Every 10,000 Years

The development of nuclear power plants causes anxiety in significant sectors of society, which is manifested in some countries by stormy acts of protest. Specialists maintain that this anxiety is irrational.

To support their statement, they cite the fact that in the history of nuclear power plants, with 240 power plants existingin the world today, there has been only one major failure--and that was without any fatalities. On the other hand, just in coal mining alone, which is necessary for producing a corresponding quantity of energy, scores of miners are killed every year.

Experts tell us further that with existing safeguards, a major failure, such as a crack in a reactor's main pipeline, can happen once in 10,000 years according to the law of probability. At the same time, however, this must not be construed that no radioactive substances make their way into the atmosphere. In setting up safety conditions, all kinds of circumstances and factors are taken into consideration as far as the limit of their probability of occurring. For example, the probability of an earthquake or other natural disasters are taken into consideration. If jet aircraft come close to a nuclear power plant, the casing protecting the reactor must be so strong as to withstand a direct hit by a diving jet aircraft--otherwise there would be a catastrophe.

For the environment there obviously exists the long-range problem of storage or neutralization of radioactive waste. As yet no one has been able to deal with this problem in a completely satisfactory way on a world-wide scale, but science does not stand still.

On the other hand, there is bound to be a certain amount of trouble in the short-run over the natural environment of Zarnowiec. The problem is that the lake's waters will be heated. This will certainly cause accelerated growth of plant like and plankton. In order to prevent the lake from being grown over, it will be necessary to stock it with stenothermal and suitable voracious types of fish. And one will have to catch these fish and...fry them.

Nuclear Power Investments

Warsaw RZECZPOSPOLITA in Polish 22 Jan 82 p 3

[Article by Slawomir Popowski: "Our Stake in Nuclear Energy"]

[Text] (C) (PAP) The recently accepted Council of Ministers' resolution in the matter of constructing a nuclear power plant in Zarnowiec is for all intents and purposes the first big important investment decision of its kind undertaken under conditions of a deep crisis such as we are experiencing. This speaks very well of the authorities' efforts at solving not only current but future and structural problems.

According to the estimates of specialists, this resolution opens a new stage in the development of Poland's power industry. Our first nuclear power plant has been located on Lake Zarnowiec (Gdansk voivodship) and will be set up together with the pumped-storage electric power plant already in operation there--a compact complex so necessary in our country's northern regions. The total power of this nuclear power plant itself will amount to 1860 megawatts. It will operate on four power units installed in pressurized water reactors and have domestic turbine sets with a power of 465 megawatts each. In the first stage, there will be two types of power units installed there. It is calculated that unit investments costs (per 1 megawatt of power) amount to about 44.4 million zlotys. This, of course, will be about 10 million zlotys more than for the conventional hard-coal fired power plant (together with outlays for mine construction and railroad transportation costs), but, on the other hand, we will save on fuel. It is estimated that starting up the Zarnowiec nuclear power plant will allow a reduction in coal consumption by about 3 million tons annually--not to mention the conservation of the natural environment or the reduction of losses in transmitting energy for the operation of the pumped-storage electric power plant.

It is worthwhile stressing the fact that safeguard systems absorb about 30 percent of the expenditures designated for constructing part of the nuclear plant. This encompasses design solutions and the plant location itself, which fulfills all the conditions set up by the International Atomic Energy Agency and Poland's regulations on X-ray protection, as well as the binding principles tested in practice with the USSR. These include applying the so-called three barrier system between the nuclear fuel in the reactor and the surrounding power plant area, as well as the double barrier system between the remaining radioactive materials. Furthermore, in all special compartments of the nuclear power plant a constant negative pressure will be maintained, shutting off the possibility of radioactive materials reaching the atmosphere. It is also customary to have a closed and completely airtight water circulation system in the reactor part of the nuclear plant.

The nuclear power plant at Zarnowiec will be built with the help and cooperation of the Soviet Union and other socialist countries. Supplying equipment to this nuclear plant is covered under a special CEMA agrement.

A major part of the equipment (over one-half), however, will come from our own industry, which should also fulfill a general supply function. We will produce a complete machine shop, a steam operating plant, a pressure stabilizer, heat exchangers, emergency power supply stations and transportation-technological equipment. Some of this equipment is already being supplied to other consignees by CEMA.

The Zarnowiec electric power plant is initiating a series of investments in the nuclear power industry. It is anticipated that the electric power plant "Kujawy" should be equipped with four power units of 1,000 megawatts each. It is also envisaged that by the year 2000 the total power of the nuclear power plants in Poland should be from 12,000 to 13,000 megawatts. Starting up these electric power plants would allow a savings of 130 to 180 million tons of hard coal from the years 1988 to 2000.

The need to maintain an energy balance speaks for a rapid as possible development of our nuclear power industry. The fact of the matter is that if in the long-run we want to overcome the growing fuel and energy problems, we have no other course than to reach out for nuclear energy. For many years this truth failed to reach the consciousness of persons responsible for economic decisions. It appeared that, having coal, we would be able to mine it unlimited quantities too. Earlier warnings by scientists and specialists-power engineers have been confirmed to the letter. In 1980, imports of fuel and energy exceeded exports for the first time.

At that time, the imbalance between the two was small. It amounted to only about 1 million tons (in units of so-called standard fuel). But in the following year it reached about 13 million tons. Of course, this may be explained by the sharp drop in mining and export of hard coal. It appears, however, that this is also the beginning of a deep-seated process with which, in the years to come, we will have struggle on a day-to-day basis.

One of the basic problems our government must cope with now under crisis conditions and in the future is satisfying the fuel needs of our country. Coal alone is not enough. We will have less of it than we had first anticipated; moreover, we must remember that coal is our chief export raw material. In turn, the very rationalization of an exclusively thriftless fuel-energy economy also does not help matters. Given these conditions, a nuclear power industry remains the only solution. We cannot make up for lost time--the first nuclear power units in Zarnowiec should be operating at this very moment--after all, one cannot waste anymore time.

Soviet-Polish Transmission Line

Warsaw TRYBUNA LUDU in Polish 20-21 Feb 82 pp 1, 4

[Communique by Leslaw Kolijewicz, issued in Moscow 19 Feb 80: "Beginning with the Second Half of the 5-Year Plan--Electrical Energy for Poland from the Chmel'nitskiy Nuclear Power Plant"]

[Text] (PAP) PAP correspondent Leslaw Kolijewicz informs us that on 19 Feb 1980, Poland's Foreign Trade Agency "ELEKTRIM" signed a contract in Moscow with the agency "TECHNOPROMEKSPORT" for supplying Soviet equipment and high-tension apparatus for building a transmission line of a voltage of 700 kilowatts from our state border to the city of Rzeszow.

The building of this line is connected with the international agreement on Poland's share in the construction of the Chmel'nitskiy nuclear power plant. As a result of this agreement we will receive electrical energy from the Soviet Union for at least 30 years.

This matter is of vital concern--beginning with the second half of the 5-Year Plan, we will receive 6 billion kilowatt hours of electrical energy annually, i.e., the kilowatt hours produced by a large power plant with a power of 1200 megawatts.

In order to build a transmission line from our state border to Rzeszow, the Soviet Union is supplying indispensable items: Substations, insulators, measuring instruments, switches and other equipment not produced by Polish industry. The building of the 700 kilowatt line itself was designed and will be implemented by Polish enterprises in accordance with Poland's norms for protecting the environment. Thus we are the third country in Europe--after the USSR and Hungary--which has applied in its own system such high voltages for long-distance transmission of electrical energy.

This transmission line will also serve in transmitting energy to Hungary, Czechoslovakia and the GDR. These countries have participated in the building costs for the Polish segment of the transmission line and the distribution station. In this way integrated programs of cooperation between socialist countries in the energy supply sector are also being implemented.

In speaking of supplying energy, one should also recall another contract signed in Moscow by "ELEKTRIM" and the Soviet agency "ENERGOMASZEKSPORT" for supplying the Bialystok region with 300 million kilowatt-hours of electrical energy from the Soviet Union this year.

9866
CSO: 5100/3015

ARGENTINA

PROGRESS IN NUCLEAR PROGRAM CONTINUES UNDETERRED BY EVENTS

Buenos Aires ENERGEIA in Spanish May 82 No 24, p 580

[Article by Martin F. Yriart: "The Nuclear Plan: Benefits From Self-sufficiency"]

[Text] The national policy of self-sufficiency in regard to nuclear power--the origins of which can be traced back beyond the awarding of Atucha I to Siemens--is a policy which led Argentina to adopt a family of reactors which use natural uranium and heavy water. This policy has passed through various stages, each one of them representing an advance in the whole process. None of these stages has lacked critics, well-intentioned and otherwise.

"We must give honorwhere it is due." Three years ago the National Atomic Energy Commission (CNEA) made the decision (later carried out through ENACE) to subsidize national private industry. This was done so that private industry would reach a sufficiently high level to allow it to participate in the manufacture of heavy components of the MZFR type (although this does not mean that the equipment is on hand at the present time). At any rate, we expressed doubts at that time, fearing that a protectionism policy for one sector of an economy which was in the process of opening up would have a doubly negative result; namely, for that sector in particular and for the economy in general.

Events of the month of April, a month which will remain indelibly engraved in the history of our country, have dispelled these doubts and have led us to believe that on the whole it is better to be alone than in bad company.

Nuclear self-sufficiency, even at the cost of greater investments, still more prolonged target dates, and the necessity to re-invent the umbrella, has proved to be a beneficial policy in the face of the coercive measures adopted by Great Britain and her allies in the present circumstances.

The list of countries which at the present time are providing technology, equipment, and supplies for the Argentine nuclear plan is not short. It extends from Brazil to Japan, passing through Canada, [West] Germany, Austria, and Switzerland, to designate only the best known. And recently it has included the Soviet Union. From this list the United States is missing and, circumstances notwithstanding, we should be conducting an appraisal of our natural allies in the region. Our historical encounters with the nation which was the cradle of democracy and the republican, representative, federal system as it is known and practiced in the contemporary world never cease to perplex us.

Following the Non-Proliferation Treaty of 1978 [sic], the United States applied the most rigid embargo in regard to cooperation and exchange between the nuclear camp and Argentina. These measures were barely softened by a few "friendly" gestures such as desisting from obvious obstruction tactics in the international sphere and such as collaboration in programs like the development of enriched low-grade fuel for experimental reactors (this latter measure basically helping to consolidate the North American policy in regard to exportation of enriched uranium). However, at the risk of sounding like a descendant of Sancho Panza, "strike while the iron is hot; do well and dread no shame; don't look at a gift horse in the mouth; etc."

The Prime Minister of Canada, Mr Pierre Trudeau, several days ago rejected a motion presented in the Parliament at Ottawa calling for the 70 professional and technical personnel now working at Embalse to be recalled. This rejection cannot be taken as the final word nor can one discount the pressures which Canada will feel in the coming weeks.

The few people who were able to see the "documentary" (almost three-quarters of an hour long) which was put together by BBC 2 on "Germany and the Argentine Atomic Bomb" and also the subsequent replies made by the Federal Republic's spokesman both on BBC and on Deutsche Welle [German television] not only appreciated Great Britain's tactical error in trying to "pressure" the Germans into withdrawing their support to the Argentine nuclear plan but also appreciated that an exactly opposite effect was achieved. This effect resulted from the definitive declarations of Mr Ruehl who in essence stated that Argentine-German cooperation in regard to nuclear energy is developing toward exclusively peaceful ends within the terms of international agreements to which the two countries are parties and under the supervision of the International Atomic Energy Agency.

The alarms sounded by Robin Denselow and David Taylor, respectively the director and producer of the BBC program, were nullified by the statements of Mr Ruehl; by those of Franz Josef Strauss, German Nuclear Energy Minister during the pertinent period; and even by those of Walter Schnurr, Director of the Nuclear Research Center, Karlsruhe, who was in charge of the Argentine-German program of nuclear cooperation in the decade of the 60's. The phantom of an Argentine atomic bomb behaves like a much more primitive weapon. Like a boomerang, to be precise.

Despite such unfounded allegations added to the difficulties the whole country was suffering prior to 2 April, the Argentine nuclear policy continues to bear fruit.

A decisive step has been taken in starting the experimental operation of the high-pressure circuit at Ezeiza, which although not yet officially inaugurated, is already in a position to begin rendering service. It is hoped, moreover, that within a short time the operational parameters required for full-scale operation will be achieved. This will allow us to try out the critical components for nuclear power plants like pumps, valves, seals, heat exchangers, and fuel elements, among others. And this in turn will make it possible to license equipment for use by national industry.

Another freely advancing program is the development of the technology for fuel elements of the CANDY [Canada Deuterium Uranium] (SUCOEM) type. This development is being accomplished within the CNEA itself and includes the design of fuel elements and their testing, of the processes and procedures of construction and control, and of the manufacturing equipment.

The processes at the laboratory level were developed by the Centro Atomico Constituyentes [Atomic Center for Components] and later on the Nuclear Fuel Elements Factory (FECN) in Ezeiza began to install a production line with the capacity to produce 5,500 fuel elements annually. That is equal to approximately 100 metric tons of uranium. Fuel rods made by the CNEA are now being irradiated in Canada.

With this production line, which is operating below the level of a pilot plant at the present time, they have begun to make prototype fuel elements, 12 of which will be installed in the core of the Embalse power plant after it is put into operation as part of the testing plan. Subsequently they will make another 150 and then 1,500 (this number to be reached in 1984). Once this program is completed, the operation of this line will be transferred to the CONUAR [Nuclear Fuel Corporation] Company, a mixed FECN-operated enterprise wherein most of the capital stock is privately held.

Under normal operations they will make 30 fuel elements per day, which means more than 1,000 fuel rods daily plus welding 2,000 end caps.

The equipment ofr manufacturing the fuel must to a large extent be developed in our country because Canada, its sole owner, will not let us have it. The automatic equipment for welding the end caps, developed and patented in Argentina, is the third generation of machines created for this purpose in our country. They will make it possible to weld 72 fuel rods every 30 minutes (144 end caps) and will be put into operation next month.

9972
CSO: 5100/2177

BRIEFS

NUCLEAR POLICY OBJECTIVES--Santa Fe, 31 May (TELAM)--Rear Adm Carlos Castro Madero stated today that the Argentine nuclear policy meets and has met the national interest. He made this statement during a telephone interview by a local radio station on the occasion of Atomic Energy Day. The head of the National Atomic Energy Commission [CNEA] stated that one of the objectives of the policy is manufacturing our own fuels, so as not to depend on foreign countries or on their pressures such as is now occurring at other levels due to the belligerency. Questioned about the agreements recently signed with the USSR, he said that they affect the Argentine nuclear plan on a small scale, but they can be expanded as support or assistance from other countries for carrying out the plan is cut off. He added: Right now no measure has been taken in this regard. Regarding difficulties which may arise due to the belligerency and the atomic policy schedule Castro Madero stated that there are three known priorities: Finish the Embalse nuclear plant; build the heavy water plant; and continue the construction of Atucha II. He admitted that the situation is hard to predict, but he assured: We will make every effort to take charge of the new situation and try to meet the reported schedule of the Argentine nuclear plan. Questioned on whether the British aggression with nuclear submarines could make the Argentine position on peaceful use of nuclear energy change, Castro Madero was categorical: No, we are not going to change our position which is firmly founded. [Text] [PY312235 Buenos Aires TELAM in Spanish 1700 GMT 31 May 82]

CSO: 5100/2179

ELECTROBRAS REPORTS ON URANIUM RESERVES

PY072356 Paris AFP in Spanish 2139 GMT 7 Jun 82

[Text] Brasilia, 7 Jun (AFP)--The state-owned enterprise ELECTROBRAS [Brazilian Electric Power Companies, Inc] revealed here today that the Brazilian uranium reserves, which currently amount to 266,300 tons, allow for the installation of 27 nuclear plants of 1,300 megawatts each.

ELECTROBRAS, which made this disclosure on reporting on the plan for supplying electricity in Brazil up to the year 2,000, said that the 1,300 - megawatt reactors can last for approximately 30 years if operated at 70 percent capacity.

Although the above plan provides for the installation of 27 nuclear plants, only the eight plants which are provided for in the German-Brazilian nuclear agreement signed in 1975 will be built.

The first two plants provided for in the German-Brazilian agreement, which have a power of 1,300 megawatts each, are being built in the city of Agra Dos Reis, located approximately 250 km south of Rio de Janeiro, next to the Angra I plant, which is the first Brazilian nuclear plant built with U.S. technology by the Westinghouse Corporation.

CSO: 5100/2183

TEXT OF NUCLEBRAS ANNUAL REPORT FOR 1981

Brasilia CORREIO BRAZILIENSE in Portuguese 16 Apr 82 pp 10-12

[Text] Brazilian Nuclear Corporation (NUCLEBRAS)

Annual report of the executive board for fiscal year 1981.

The executive board of the Brazilian Nuclear Corporation (NUCLEBRAS) presents to its stockholders the results of the activities carried out by the corporation in 1981.

NUCLEBRAS, established on 16 December 1974 by Law No 6,189, completed its seventh year of activity in 1981.

The past fiscal year was marked by the intensification of construction work on the industrial facilities of the NUCLEBRAS Group as well as by the positive results achieved in the area of uranium prospecting and exploration.

The activities within the framework of the nuclear agreement signed with the Federal Republic of Germany proceeded normally.

1. Fiscal year 1981 was marked by the beginning of management activities of the Angra-2 and -3 projects by the NUCLEBRAS Nuclear Power Station Construction Corporation (NUCON), followed by the signing of the NUCON-FURNAS contract for construction of those plants.

In the Resende Industrial Complex, construction and commissioning of the first stage of the fuel elements factory and the civil works of the first cascade of the enrichment plant were concluded.

In the mining-industrial sector, the uranium reserves in Itataia and Lagoa Real were increased by 30,000 tons, and preproduction of uranium concentrate was begun in Pocos de Caldas.

Construction of the pressure vessel for the Argentine Atucha-II reactor was also begun by the NUCLEBRAS Heavy Equipment Corporation (NUCLEP).

2. Activities in the Area of the Fuel Cycle

2.1 Mineral Prospecting and Exploration

During the year 1981, NUCLEBRAS conducted 43 mineral prospecting and exploration projects, distributed throughout the Brazilian territory.

In the implementation of those projects, the following work was carried out:

Geologic Surveying	57,947	square kilometers
Geologic Mapping	750	" "
Analysis and Interpretation of Aerogeophysics	231,500	" "
Geologic Probing	8,464	meters
Probing of Cubic Content	42,204	"
Profiling	53,065	"
Analytical Determinations	108,604	"

As a result of the activities carried out in this sector, Brazilian uranium reserves increased from 236,300 tons to 266,300 tons of U_3O_8.

Geologic Reserves of Uranium in Metric Tons of U_3O_8

NUCLEBRAS	Type of Reserve					
	1980			1981		
	Measured and Indicated	Inferred	Total	Measured and Indicated	Inferred	Total
Pocos de Caldas plateau/ Minas Gerais	20,000	6,800	26,800	20,000	6,800	26,600
Figueira/Parana	7,000	1,000	8,000	7,000	1,000	8,000
Iron-bearing Quadrilateral/Minas Gerais	5,000	10,000	15,000	5,000	10,000	15,000
Amorinopolis/Goias	2,000	3,000	5,000	2,000	3,000	6,000
Uranium-bearing territory of Rio Preto/Goias	500	500	1,000	500	500	1,000
Uranium-bearing territory of Itataia/Ceara	83,000	39,500	122,500	83,000	54,500	137,500
Uranium-bearing territory of Lagoa Real/Bahia	18,000	30,000	48,000	18,000	45,000	63,000
Espinharas/Paraiba	5,000	5,000	10,000	5,000	5,000	10,000
Total	140,500	95,800	236,300	140,500	125,800	266,300

2.2 Mining and Beneficiation of Uranium Ore

2.2.1 Mining-Industrial Complex of Pocos de Caldas Plateau

The most important event of the year 1981 with reference to activities connected with mining was the beginning of industrial preproduction of uranium concentrate for the first time in Brazil, which occurred at the Pocos de Caldas plateau mining-industrial complex.

Designed to produce 500 tons per year of yellow-cake, the plant of the Pocos de Caldas plateau mining-industrial complex will continue to operate in a preoperational phase for the first 4 months of next year, when it will then go into the industrial production phase properly speaking.

Organized into two large sectors (mine and beneficiation plant), the NUCLEBRAS Pocos de Caldas plateau mining-industrial complex processes 2,500 tons of ore a day and, in addition to the production of uranium concentrate already mentioned, it will also produce molybdenum and later zirconium, starting in 1983.

2.2.2 Itataia Project

The Itataia deposit in the municipality of Santa Quiteria in the state of Ceara, with reserves of 137,500 tons of U_3O_8, is an occurrence of uranium in phosphated rocks, permitting the economic exploitation of uranium and phosphate at the same time.

In 1981, laboratory studies were completed to determine the process for the extraction of uranium and the utilization of the phosphoric acid, and preliminary planning was completed for exploitation of the deposit, which indicates the need to build a pilot plant with a nominal capacity of about 50 tons of uranium concentrate per year for optimization of the process determined in the laboratory.

2.3 Resende Industrial Complex

The fuel cycle activities pertaining to the phases of conversion, isotopic enrichment and manufacture of the fuel element are carried out at the Resende industrial complex in the state of Rio de Janeiro.

2.3.1 Conversion Plant

In 1981, in addition to the training program in the factories of the UPUK Group in France, the basic design of the plant was completed. The prequalification of Brazilian suppliers was begun with the aim of maximizing the percentage of national participation in the undertaking.

2.3.2 Isotopic Enrichment Plant

The uranium isotopic enrichment plant is being implemented in two phases by the NUCLEBRAS Isotopic Enrichment Corporation (NUCLEI), a NUCLEBRAS subsidiary. In the first phase, the first 24-stage cascade for the enrichment of uranium will be installed, with operational tests scheduled for 1984; its civil works were completed in October 1981. In 1981 also, NUCLEI began the purchase of equipment produced nationally and abroad and the National Nuclear Energy Commission (CNEN) granted a license for installation of the equipment.

2.3.3 Fuel Elements Factory

The civil works for the first stage--the manufacture of the rods and the assembly of fuel elements--having been completed in 1980, the electromechanical equipment was installed in 1981, and the factory, which will go into operation in 1982, was commissioned.

2.4 Reprocessing Pilot Plant

Starting from the conceptual plan for the processing pilot plant concluded on the basis of a contract signed by NUCLEBRAS and KEWA/UHDE, in 1981 UHDE completed the basic design for the plant and began the detailed design, with the broad participation of NUCLEBRAS.

3. Activities in the Area of the Construction of Nuclear Power Stations

By Decree-Law No 1,810 of 23 October 1980, NUCLEBRAS received the exclusive right to build nuclear power stations. Until that date, with reference to the construction of nuclear electric plants, NUCLEBRAS participated only in the services of project engineering and the manufacture of heavy components. In 1981, on the basis of that decree-law, NUCLEBRAS established the subsidiary, NUCLEBRAS Nuclear Power Station Construction Corporation(NUCON), which began its activities that same year.

3.1 Angra-II and Angra-III

On 19 February 1981, the president of the republic, approving justifying Memorandum No 002/81, ordered the transfer to NUCON of responsibility for the construction, assembly, supplying and commissioning of Angra-II and Angra-III, formerly the responsibility of Furnas Electric Power Stations Corporation.

The transfer was carried out in two stages:

On 31 March 1981, Furnas and NUCON signed a protocol under which NUCON assumed the construction of the two nuclear power stations.

On 31 July 1981, Furnas signed two contracts with NUCON: one as overall contractor with the guarantee of a firm price and time period for construction of the two plants, delivering them "ready to operate"; and one for supplying the first charge of nuclear fuel for these plants.

On 30 July 1981, by Decree No 85,250, NUCLEBRAS was authorized to finance up to 100 percent of the construction of the nuclear plants, having signed contracts with Furnas for financing the construction of Angra-II and Angra-III, and for supplying the first fuel charges of those plants.

On 31 July 1981, NUCLEBRAS announced the opening of competitive bidding for the civil works of Angra-III; Angra-II will remain with the Norberto Odebrecht construction company.

On 15 September 1981, NUCON began work on the heading slab for the Angra-II foundation, which was completed on 11 November, when work on the foundation was completed.

In the fourth quarter of 1981, the process of prequalifying the civil construction companies for Angra-III and the electromechanical installation companies for Angra-II was begun.

NUCLEBRAS resumed and intensified the placement of orders in national industry to supply equipment for Angra-II and Angra-III.

3.2 Iguape-I and Iguape-II

In 1981, through the NUCLEBRAS Engineering Corporation (NUCLEN), NUCLEBRAS began the infrastructure work of the site and of preparation of the access roads to the two new plants, at the same time conducting hydrologic, geologic and topographic studies of the site.

3.3 Manufacture of Heavy Equipment

In 1981, the NUCLEBRAS Heavy Equipment Corporation (NUCLEP), located in the municipality of Itaqguai-Rio de Janeiro, began the manufacture of the pressure vessel and the four steam generators for Iguape-I. It also began the manufacture of the pressure vessel for the Argentine Atucha-II nuclear power plant, as a subcontractor of the German KWU company, as well as the manufacture of the pressurizer for Angra-III, the latter being transferred from the scope of German supply responsibility to the national area.

Activities in the Area of the Production of Heavy Minerals

In the area of heavy minerals, the NUCLEBRAS Monazite and Associated Minerals Limited (NUCLEMON), established in April 1976, produced 2,034 kilograms of rare earths in 1981, in addition to compounds of thorium and uranium, as indicated below, with positive results in its balance:

Ilmenite	16,244 tons
Monazite	2,070 tons
Zirconite	4,760 tons
Compounds of sodium	8,185 tons

5. Activities in the Areas of Technology and Development

The activities of the NUCLEBRAS Group in the area of technological development are concentrated in the Nuclear Technology Development Center (CDTN) in Belo Horizonte and in the NUCLEBRAS associate in the Federal Republic of Germany, NUSTEP.

5.1 Nuclear Technology Development Center

In 1981, the CDTN directed its attention primarily toward training personnel and supporting the units of the NUCLEBRAS Group, the following activities being deserving of mention:

Analytical support for mineral prospecting and exploration activities.

Development of a process for the treatment of the ore from Itataia and Lagoa Real.

Performance tests of the dual deflection separation elements for the isotopic enrichment of uranium.

Lixiviation studies for the selection of national cements taking into account the incorporation of radioactive wastes.

Qualification in the techniques of welding stainless steel and special alloys.

Completion of the design and beginning of the purchase of circuit equipment for the tests of reactor components.

Development of data acquisition equipment for field operation in meteorology and environmental engineering, in the process of patent registration.

Development of codes for analysis of reactor safety, in cooperation with KWU.

Research in the use of thorium as a fuel in PWR reactors.

Basic activities for licensing the different units of the fuel cycle and nuclear power stations.

6. Activities in the Area of Industrial Certification and Personnel Training

The industrial promotion program, which has already qualified 350 national companies, enabling them to participate in the Brazilian nuclear program, has resulted in an appreciable increase in the percentage of nationalization of components for the nuclear plants.

With regard to training, specialization and advancement of personnel, from 1974 to 1981 NUCLEBRAS has provided training for 2,443 middle- and high-level technicians at home and abroad.

Under the sponsorship and supervision of NUCLEBRAS: 513 technicians completed courses in the area of nuclear technology through agreements with the Federal Universities of Rio de Janeiro (COPPE) and Minas Gerais.

The following chart gives the figures pertaining to the education and training of personnel in 1981.

Education and Training

At Home	No of participants
Specialization in nuclear technology	49
Quality control	48
Training in industry	269
Mineral prospecting and exploration	3
Abroad	
Reactor engineering	15
Heavy components	1
Manufacture of fuel elements	1
Isotopic enrichment	8
Reprocessing	1
Nuclear protection and safety	3
Research and development	3
Mineral prospecting and exploration	2

7. Activities in the Social Area

NUCLEBRAS and its subsidiaries have a staff of 6,300 employees and its contractors employ 6,200 persons directly on behalf of the NUCLEBRAS Group.

Associated with the social benefits resulting from the creation of direct employment by the NUCLEBRAS Group, are the financial benefits for the municipalities in which industrial units are being installed, which furthermore benefit the Brazilian industrial park as a whole, with the gradual increase of the percentage of national participation of equipment.

With reference to the construction of nuclear power stations, the estimate of the number of jobs generated in the specific case of a 1,300 MW plant is:

Suppliers--direct	20,000	man/years
Suppliers--indirect	16,800	" "
Construction--installation	6,000	" "
Miscellaneous	6,000	" "
Total	48,800	" "

Continuing its activities, begun in September 1979, the NUCLEBRAS Social Security Institute (NUCLEOS) closed the year 1981 with reserves in the amount of 1,348,668 cruzeiros, showing an increase of 238 percent compared to the previous year, and the social security revenues collected during the past year increased 91 percent compared to the previous year.

The total number of members of NUCLEOS reached 3,584 as of 31 December 1981.

In addition to social security benefits, NUCLEOS, on behalf of the employees, administered supplementary health care, nutritional assistance, group life insurance, the agreement with the National Social Security Institute (INPS) for the employees of the NUCLEBRAS Group companies.

Explanatory Notes to the Financial Statements as of 31 December 1981

Note 1. Activities:

In addition to the activities of exploring and mining the deposits of nuclear ore and its associated elements and the gradual establishment in the country of the industrial park designed to complement the stages of the fuel element cycle, the company's charter also envisages as part of its corporate operations, corporate participation as well as administrative and financial support for the subsidiaries and associates.

With the advent of Decree-Law No 1,810, dated 23 October 1980, the company acquired the exclusive right to conduct studies, prepare projects and to build nuclear power stations and, consequently, in order to attend to those specific missions, the NUCLEBRAS subsidiary NUCLEBRAS Nuclear Power Station Construction Corporation (NUCON) was established by Decree 85,290 of 23 October 1980.

Decree 86,250, of 30 July 1981, which governs the furnishing of nuclear-electric plants, establishes that NUCLEBRAS will completely finance the plants that it furnishes directly or through its subsidiary, with the respective price being paid after the purchasing concessionaire has received the nuclear-electric unit ready to operate.

Article 49 of the aforementioned decree establishes that in the event that there are hydroelectric alternatives for the supplying of electric energy in the same amounts as the nuclear option, with an average installed kilowatt cost checked at the centers of consumption below the cost of the average installed kilowatt of nuclear origin with reference to the same point, payment of the respective price will be limited to the cost of the hydroelectric alternative. The hydroelectric alternatives referred to must be available at the level of basic design or, at the minimum, at the level of a feasibility study, of equivalent value, on the date of the decision to build the nuclear-electric plant.

As a result of the events referred to above, there was a significant inflow of funds necessary to the management of its operations derived from the attraction of financing abroad and the budget appropriations granted by the federal government.

Note 2. Summary of the Principal Accounting Practices

The principal accounting practices adopted by the company in the preparation and presentation of the financial statements are as follows:

System of Accounting of Transactions:

The double-entry bookkeeping system is adopted to record the changes in assets that have occurred during the fiscal year. The application of that system requires entering the revenues, costs and expenses at the time that they are acquired or incurred, therefore, independent of their actual receipt or payment.

The company is in a preoperational phase. In those circumstances, all costs and expenses incurred, as well as the revenues derived from activity of a contingent nature are being deferred for acknowledgment in the results of future fiscal years following the entry into normal operations.

Presentation of the Financial Statements:

The financial statements are prepared and presented in accordance with the provisions embodied in Law No 6,404/76, with the rules of Directive No 1 and Resolution No 8/80 of the Negotiable Securities Commission, and fiscal legislation.

Separation of Terms of Receivables and Payables:

The assets receivable and liabilities payable for terms up to 360 days are classified as circulating.

Acknowledgment of Inflationary Effects

The effects of inflation on the financial statements are acknowledged by entering the monetary correction on the permanent assets and the net assets based on the variations of the value of the ORTN. The net result of that correction is being deferred to be amortized at the time of the beginning of operations. The other assets and liabilities subject to correction or adjustment due to exchange variation are also corrected and, in the same manner, the respective net results are entered to the account of the deferred assets for amortization against the results of future fiscal years.

Evaluation Criteria

a) The financial applications in open market securities are entered at the purchase cost plus the proportional yields received up to the date of the close of the fiscal year.

b) The deposits in foreign currency--Central Bank (BACEN) Circular No 349--are adjusted to the buying exchange rate in effect on the date of the financial balance;

c) The stocks are entered at the average purchase costs, which are less than the market prices or the net realized. Imports underway are entered at the cost incurred up to the date of the financial balance.

d) The investments stemming from corporate participation in subsidiaries and the associate are evaluated by the asset equivalence method. The other investments are entered at the corrected cost.

3) The method of amortization of the agio pertaining to the investment in the associate--NUSTEP GmbH & Co Kg--will be determined in the future at the time of completion of the project that is now underway and in charge of the associate.

f) The fixed assets are entered at the corrected cost of purchase or construction. Depreciation is calculated by the linear method by the application of the rates that take into account the useful economic life of the assets.

g) The deferred assets are entered at the corrected cost.

Note 3. Loans to the Subsidiaries

	Thousands of Cruzeiros	
	1981	1980
NUCLEBRAS Mining Auxiliary Corporation NUCLAM	511,594	212,671
NUCLEBRAS Isotopic Enrichment Corporation NUCLEI	8,298,570	1,460,914
NUCLEBRAS Engineering Corporation NUCLEN	2,485,148	904,629
NUCLEBRAS Heavy Equipment Corporation NUCLEP	13,262,256	8,544,930
NUCLEBRAS Monzaite and Associated Minerals Corporation-NUCLEMON	38,305	--
	24,595,873	11,123,144

Financial charges are computed on the debit balances by the application of rates that vary between 3.74 and 8.25 percent per month depending on the dates on which the funds were released.

Note 4. Stocks

	Thousands of Cruzeiros	
	1981	1980
Raw materials	873	--
Indirect material--national	105,836	--
Indirect material--imported	378,867	--
Material being beneficiated abroad	3,642,702	--
Warehoused	286,489	13,332
Imports underway	97,306	--
	4,512,073	13,332

The material being beneficiated abroad is represented by the shipments made to URENCO Limited and Kraftwerk Union Aktiengesellschaft of 137,382.33 kilograms of uranium in the form of yellowcake (U_3O_8) and 306,320.0 kilograms of uranium converted into hexafluoride (UF_6) in the process of enrichment.

Note 5. Financing Granted--FURNAS Electric Power Stations Corporation

This is intended to totally finance the contracts for the overall contract work and for supplying the nuclear fuel for units 2 and 3 of the Almirante Alvaro Alberto Nuclear Power Station signed between Furnas Electric Power Stations Corporation and the NUCLEBRAS Nuclear Power Station Construction Corporation (NUCON) on 31 July 1981.

The financing granted yields semiannual and quarterly interest, respectively, calculated pro-rata-tempore on the debit balances corrected through the application of weighted average rates equivalent to the cost of acquisition of the funds (the portion of the funds of third parties), and to the rate of 12 percent per annum (the portion of its own funds).

The monetary correction is calculated on the debit balance and on the amortizations made through the application of average factors weighted by correction equivalent to the cost of acquisition of the funds (the portion of third parties), and by the variation of the value of the OETN (the portion of its own funds).

The balances will be amortized, respectively, in 20 semiannual installments and in 12 quarterly installments due consecutively 6 months after the date of acceptance and of taking possession of each of the units of the nuclear power station.

All the financing granted has been guaranteed by letters of guarantee signed by the Brazilian Electric Power Stations Corporation (ELETROBRAS) in the overall amount of 401,958,230,000, cruzeiros readjustable.

Note 6. Cost of Services and Equipment Underway

This is substantially represented by the expenses incurred in the stages of contracting and importing services and equipment at home and abroad intended for units 2 and 3 of the Almirante Alvaro Alberto Nuclear Power Station.

Note 7. Investments

	Thousands of Cruzeiros	
	1981	1980
Corporate participation in subsidiaries and outstanding in the associate	10,487,521	2,070,776
Minus portions to be integrated	--	175,760
	10,487,521	1,895,016
Agio in the associate	650,230	332,480
Other investments	39,438	20,165
	11,177,189	2,247,661

a) Opposition of Investments in the Subsidiaries and Outstanding in the Associate in 1981:

(in thousands of Cruzeiros)

	Percent of partici-pation	Net assets as of 12 Dec 81	Adjustment derived from variation of percent of partici-pation in the capi-tal of subsidiaries	Corrected cost of investment	Asset equivalence adjustment	Asset value of investment
NUCLAM	51.0	360.233	--	183,718	(1)	183,718
NUCLEI	75.0	2,827,732	--	2,120,799	(2)	2,120,799
NUCLEN	75.0	(652,315)	--	--	--	--
NUCLEP	88.66	8,710,207	197,259	8,367,753	(842,543)	7,722,469
NUCLEMON	99.99	460,582	--	405,003	55,532	460,535
NUCON	100.0	(173,307)	--	771,036	(771,036)	--
			197,259	11,848,309	(1,558,047)	10,487,521
NUSTEP GmbH & Co Kg	50.0	(137,913)	--	--	--	--
			197,259	11,848,309	(1,558.047)	10,487.521

(1) In preoperational phase
(2) In establishment phase

The financial statements of the subsidiaries and the associate were examined by independent auditors.

b) Additional Information

	NUCLAM	NUCLEI	NUCLEN	NUCLEP	NUCLEMON	NUCON	NUSTEP
Capital realized	302,354	1,411,188	89,741	8,225,000	340,485	500,000	5,672
No of shares or quotas held	154,200	1,058,391	67,306	7,292,285	340,451	500	576
Type of shares	ON	ON	ON	ON	Quotas	ON/OP	Quotas
Profit (loss) for fiscal year	(1)	(2)	289,456	(950,306)	55,538	(944,343)	(13,536)
Accounts receivable	11	--	--	--	46,446	--	--
Accounts payable	--	--	93,294	1,245,860	6,982	42,467,932	--
Loans granted	511,594	8,298,570	2,485,148	13,262,256	38,305	--	--
Advances for increase of capital	366,677	40,876	65,588	--	21,454	1,983,556	1,585,822
Revenues	407,671	3,551,118	1,426,511	10,841,052	29,884	277,083	607,248

(1) In preoperational phase
(2) In establishment phase

[ON-nominative common;
OP-bearer common]

Note 8. Fixed

(in thousands of Cruzeiros)

	1981			1980
	Corrected cost	Corrected depreciation and amortization	Net value	Net value
Land	1,065,811	--	1,065,811	588,827
Buildings	232,695	55,431	177,264	75,317
Machinery and equipment	475,881	106,144	369,737	112,828
Facilities	105,413	35,435	69,978	35,210
Vehicles	98,287	54,587	43,700	10,549
Furniture and fixtures	359,041	105,521	253,520	79,770
Subtotal	2,337,128	357,118	1,980,010	902,501
Imports underway	85,106	--	85,106	7,628
Projects underway	24,548,093	--	24,548,093	7,113,867
Other fixed assets	4,912	--	4,912	2,257
Current fixed assets	3,492,819	--	3,492,819	3,004,962
Total	30,468,058	357,118	30,110,940	11,031,215

Note 9. Deferred

(in thousands of Cruzeiros)

	1981	1980
Expenditures in the uranium prospecting and exploration program	11,684,570	4,882,068
Expenditures in the development of the Pocos de Caldas deposit	15,117,352	4,727,291
Expenditures in obtaining technical information, consultation and training	8,779,226	1,574,946
Interests on loans and financing (minus active transactions)	13,704,782	5,465,079
Net monetary variations	30,469,272	12,936,004
Monetary correction of permanent assets and set assets	(24,431,073)	(7,752,324)
Improvements to assets of third parties (minus amortization: 84,135 cruzeiros in 1981 and 29,408 cruzeiros in 1980)	84,505	52,162
Income tax on inflationary profit	1,990,717	--
Other expenditures (net of revenues) to be amortized (minus amortization 113,744 cruzeiros in 1981 and 43,618 cruzeiros in 1980)	15,084,252	1,427,647
	72,483,603	23,312,883

Note 10. Subsidiaries

The balance is substantially represented by the advances made by the NUCLEBRAS subsidiary NUCON to be applied to the purchase and construction of equipment as well as the manufacturer of fuel elements intended for units 2 and 3 of the Almirante Alvaro Alberto Nuclear Power Station.

Note 11. Financing and Loans

	Thousands of Cruzeiros		Rate of Charges (in percent)	Last expiration
	1981	1980		
In National Currency				
Various institutions	10,891,721	9,220,384	55 - 126.7	1988
Minus short-term portion	(4,358,094)	(3,642,809)		
	6,553,627	5,577,575		
In Foreign Currency				
U.S. dollar: $396,881,000 (1980: $268,501,000)	50,721,561	17,586,827	0.875-1.875 above LIBOR*	1991
German Marks: DM 736,127,000 (1980: DM 166,122,000)	41,756,889	5,619,424	0.875-2.0 above LIBOR*	1991
French francs: FF 61,799,000 (1980: FF 15,370,000)	1,385,810	224,456	7.2 - 7.25 per annum	1989
Minus short-term portion	(5,419,531)	(1,845,459)		
	88,444,729	21,585,248		
	94,978,356	27,162,823		

*[LIBOR-London Interbank Offered Rate]

Guarantees:

The loans in foreign currency are guaranteed for the most part by endorsement of the Federative Republic of Brazil.

The national loans in their majority were made through the discounting of promissory notes.

The loans from the Machinery and Equipment Financing Fund (FINAME) are guaranteed by fiduciary conveyance of the equipment purchased with the loan funds.

For the loans from the Studies and Plans Financing Agency (FINEP), NUCLEBRAS offered as a guarantee the share of the Single Tax on Lubricants and Liquid and Gas Fuels allocated to it by the federal government.

Note 12. Capital

The subscribed and integrated capital is represented by 983,819,000 nominative common shares and 691,240,000 bearer common shares in the value of 2.45 each (1.62 cruzeiros in 1980)

Note 13. Subventions for Investments

These represent funds derived from the Single Tax on Lubricants and Liquid and Gas Fuels and from grants received from the International Atomic Energy Agency (IAEA) to be applied in research and development activities in nuclear minerals and nuclear technology and in establishing nuclear fuel cycle units.

Note 14. Federal Credits for Increase of Capital

These represent credits derived from budgetary appropriations and supplements to reinforce budgetary appropriations granted by the Ministry of Mines and Energy through agreements and decrees of the federal government.

Because they represent credits specifically intended for the participation of the federal government in the capital of NUCLEBRAS, they were classified separately in the financial statement and corrected monetarily. The value of the monetary correction is added to the account of subventions for investments in the subgroup of capital reserves.

Statement of Sources and Applications of Funds (in thousands of cruzeiros)

	Fiscal Year ending 31 December	
Sources	1981	1980
From Stockholders		
Advances for future increase of capital	38,910,000	1,593,850
From Third Parties		
Financing	37,735,295	10,184,227
Subventions for investment	333,759	2,739,665
Funds for the formation of nuclear stocks (Law 5,876/73)	154,351	390,058
Credits of subsidiaries and associate	2,510,807	--
Suppliers abroad	3,093,342	--
	82,737,554	14,907,800

[continued]

[Continuation of Note 14]

Applications	Fiscal Year ending 31 December 1981	1980
In Permanent Assets		
Purchases of fixed assets	7,875,671	4,026,032
Increase of deferred assets	29,010,681	7,758,615
Increase of investments	7,340,757	--
For Other Purposes		
Increase of advances to the associate for future increase of capital	1,848,217	199,596
Increase of financing to the subsidiaries and associate	--	2,648,419
Debtors by financing--third parties	53,881,982	--
Transfers to short-term or long-term loans and financing	7,329,544	2,047,043
Increase of other long-term receivables	741,602	4,173
	108,028,454	16,683,878
Reduction of net circulating capital	(25,290,900)	(1,776,078)

Represented by:

	Balances on 31 Dec 81	31 Dec 80	31 Dec 79	Reduction Variation for 31 Dec 81	31 Dec 80
Circulating assets	35,432,465	4,682,947	1,715,254	30,749,518	2,967,693
Circulating liabilities	64,486,922	8,446,504	3,702,733	56,040,418	4,743,771
	(29,054,457)	(3,763,557)	(1,987,479)	(25,290,900)	(1,776,078)

The explanatory notes are an integral part of the financial statements.

Report of the Fiscal Board

The fiscal board of the Brazilian Nuclear Corporation (NUCLEBRAS), through its undersigned regular members Colombo Machado Salles, Paulo Cabral de Araujo, and alternate member Roberto Goncalves de Toledo, in compliance with the legal provisions governing stock companies in Brazil, has examined the financial statements, the explanatory notes and the annual report of the executive board on the business activities of the corporation. It has also studied the proposal to be submitted for deliberation at the next regular general assembly, to put into effect the capitalization of the capital reserve formed as of the closing balance of the corporate fiscal year 1981 and resulting from the monetary correction of the Capital Received, as well as from the correction of the Authorized Capital, at the same rates, in accordance with the provisions of Articles 167 and 168, Paragraph 29 of Law 6404/76, respectively; as a consequence of which the following modifications are effected: the par value of shares, from 2.44 to 4.78 cruzeiros; the subscribed and integrated capital, from 4,102,258,957.00 to 8,006,778,913.00 cruzeiros; the authorized capital, from 12,094,137,560.00 to 23,692,613,744.00, corresponding to 2,973,968,252 common shares and 1,982,645,502 preferred shares.

Having received from the administration all of the information and explanations necessary for the performance of its legal and statutory mission, the fiscal board is of the opinion that the accounts, the financial statements, and the respective explanatory notes and annual report are in condition to merit approval and declare, further, that the aforementioned proposal is in accord with pertinent legislation and with the corporate statute and therefore in condition to merit the approval of the regular general assembly of stockholders of the corporation.

Dated: 7 April 1982

/s/ Colombo Machado Salles	/s/ Paulo Cabral de Araujo	/s/ Roberto Goncalves de Toledo

Paulo Nogueiro Batista, president, CPF 075,071,194-91
Jose Pinto de Araujo Rabello, director, CPF 290,227,387-87
Ney Freire de Oliveira Junior, director, CPF 006,428,788-20
Ilmar Penna Marinho Junior, director, CPF 021,253,317-72
Carlos Thadeu de Freitas Gomes, director, CPF 036,473,587-20
Jose Berthoux Tavares, accountant, CRC-RJ 014,347-9-S-DF 349, CPF 024,188,357-15

Financial Statement

(in thousands of cruzeiros)

Assets

	As of 31 December	
	1981	1980
Circulating		
Cash and banks	8,028,095	220,840
Financial applications	1,609,040	122,891
Accounts receivable	78,220	88,140
Costs of services and equipment underway	12,879,711	1,069,808
Deposits in foreign currency Circular No 349-BACEN	1,151,306	2,934,656
Other credits	7,110,205	233,280
Stocks	4,512,073	13,332
Expenses of following fiscal year	63,815	--
	35,432,465	4,682,947
Long-Term Receivable		
Loans to subsidiaries	24,595,873	11,123,144
Advances to subsidiaries and associate for increase of capital	4,063,973	1,124,506
Financing granted- FURNAS Electric Power Stations Corporation	76,362,518	--
Other credits	790,800	49,198
	105,813,164	12,296,848
Permanent		
Investments	11,177,189	2,247,661
Fixed	30,110,940	11,031,215
Deferred	72,483,603	23,312,883
	113,771,732	36,591,759
	255,017,361	53,571,554

The explanatory notes are an integral part of the financial statement

Financial Statement

(in thousands of cruzeiros)

Liabilities	As of 31 December 1981	As of 31 December 1980
Circulating		
Suppliers (includes accounts with subsidiaries: 1981 111,208 cruzeiros and 1980 7,461 cruzeiros)	9,892,770	2,530,682
Financing and loans	9,777,625	5,488,268
Subsidiaries	43,814,068	--
Other payables (includes accounts with subsidiaries 1981: 197,599 cruzeiros)	1,002,459	427,554
	64,486,922	8,446,504
Long-Term Payable		
Suppliers	3,093,342	--
Financing and loans	94,978,356	27,162,823
Provision for income tax	1,982,157	--
Other payables (includes accounts with subsidiaries 1981: 711 cruzeiros)	3,536,783	599,622
	103,590,638	27,762,445
Net Assets		
Authorized capital	12,094,137	8,021,049
Minus capital to be subscribed	7,991,879	5,300,277
Subscribed and integrated capital	4,102,258	2,720,722
Capital reserves	41,133,185	11,965,999
Profit reserves	149,915	76,655
Accrued profits	92,627	47,363
	45,477,985	14,810,789
Federal Credit To Increase Capital		
Federal credit to increase capital	41,461,816	2,551,816
	255,017,361	53,571,554

The explanatory notes are an integral part of the financial statements.

Statement of Changes in Net Assets

(in thousands of cruzeiros)

	Capital	Capital Reserves			Profit Reserves				Total
		Monetary correction of capital	Other monetary corrections	Subventions for investments	Legal	Development of the nuclear technology	Special from investments in subsidaries & associate	Accumulated profits	
Balances as of 31 Dec 79	1,842,564	1,333,471	881,351	3,482,706	4,079	4,013	42,749	31,413	7,422,346
Adjustment of previous FY	--	(255,263)	--	--	--	--	--	--	(255,263)
Funds and subventions received	--	--	--	2,727,013	--	--	--	--	2,727,013
Increase of capital	878,208	(878,208)	--	--	--	--	--	--	--
Monetary correction	--	1,381,486	447,513	3,045,930	2,071	2,037	21,706	15,950	4,916,693
Balances as of 31 Dec 80	2,720,772	1,381,486	1,328,864	9,255,649	6,150	6,050	64,455	47,363	14,810,789
Funds and subventions received	--	--	--	333,759	--	--	--	--	333,759
Increase of capital	1,381,486	(1,381,486)	--	--	--	--	--	--	--
Monetary correction	--	3,920,510	1,269,989	25,024,414[1]	5,878	5,782	61,600	45,264	30,333,437
Balances as of 31 Dec 81	4,102,258	3,920,510	2,598,853	34,613,822	12,028	11,832	126,055	92,627	45,477,985

The explanatory notes are an integral part of the financial statement

[1] See Note 14

Auditors' Report

Honorable Directors of the
Brazilian Nuclear Corporation (NUCLEBRAS)

1. We have examined the statements of assets and liabilities of the Brazilian Nuclear Corporation (NUCLEBRAS) as of 31 December 1981 and the respective statements of changes in net assets and of the sources and applications of funds for the fiscal year ending on that date. Our examinations were made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

2. Previously, we examined and issued our report on the financial statements for the fiscal year ending 31 December 1980, the figures of which are presented for purposes of comparison.

3. In our opinion, the financial statements referred to in the first paragraph fairly represent the assets and financial position of the Brazilian Nuclear Corporation (NUCLEBRAS) as of 31 December 1981, the changes in its net assets and the sources and applications of its funds for the fiscal year ending on that date, all in conformity with generally accepted accounting principles applied on a basis consistent with the previous fiscal year.

Rio de Janeiro, 2 April 1982
Boucinhas, Campos & Claro S/C
CRC. SP -5,528-S - RJ

Sergio Brilhante de Albuquerque; Accountant - CRC-RJ-18064-2

8711
CSO: 5100/2169

ESCOM CHIEF CRITICIZES U.S. FOR BREAKING URANIUM CONTRACT

Johannesburg RAND DAILY MAIL 18 May 82 p 13

/Article by Adam Payne/

/Text/

A STRONG attack on the US Department of Energy (DOE) for breaking its contract to supply enriched uranium to Escom for Koeberg was made by Mr Jan Smith, chairman of Escom, in an interview with Mr Rob Laufer, editor of Nucleonics Week, published in New York by McGraw-Hill.

Mr Smith said: "Why should we be subject to deliberations between Washington and Pretoria? It's almost blackmail, isn't it? Why should a commercial agreement between DOE and Escom be subject to political considerations? The Nonproliferation Act has a lot of merit, but Koeberg is not going to proliferate."

Mr Smith said that if Escom had known in 1976 all the fuss that would come over Koeberg, he doubted whether Escom would have gone to the trouble of a nuclear plant.

The "fuss" revolves around Escom's efforts to secure enriched uranium for Koeberg — first through a long-standing contract with DOE, and then on the world market.

Mr Laufer quotes sources outside Escom as saying that efforts to secure fuel were begun as much as four years ago when it became clear that the US would not fulfill the contract Escom signed with DOE, unless South Africa signed the Nonproliferation Treaty and agreed to full-scope safeguards.

"I understand the US Government's position in not breaking the law but they have to understand us, too," said Mr Smith. "Escom had an agreement with DOE, not anyone else. We are not amused by someone not fulfilling a contract. This is the first time this has happened to us."

Mr Smith portrayed Escom as an apolitical entity interested solely in generating electricity.

Looking ahead, he said there was no indication that DOE was working towards a solution.

He called the purchase of enriched uranium from Switzerland's Kaiseraugst consoritium and possibly another European entity a "temporary expedient".

"The French (fabricated fuel) will see us through for a certain period of time; after that we do not know what we will do . . . one thing is certain: we can't let a thing of 2-million kw stand idle."

Mr Smith said: "The post-first core gives us problems, and it's there that we seem to be getting no help from the US. If they don't intend to honour the contract they should say so."

Mr Smith also asserted that "nuclear fuel is all over the world, it's easy to get"

As for supply from the Uranium Enrichment Corporation of South Africa (Ucor) which is building a small commercial plant due for completion no sooner than 1987, Mr Smith said that Ucor is not an automatic supply and that it will have to submit a tender like any other enricher.

Escom will not need another nuclear power station until the mid-1990s and when another station is decided on a longer lead time than the 78 months for Koeberg will be allowed. Mr Smith made this clear in the interview.

On the possibility of another nuclear power station, he said Escom is busy with an analysis on which will be based the organisation's nuclear plans for the rest of the century.

Mr Laufer comments that Escom itself is no more than lukewarm towards additional plants and completely rules out any large programme.

Escom's present capacity is 20 000 Mw, with 70 000 Mw projected by the end of the century.

Escom's analysis will come to conclusions on the best ways to reach 70 000 Mw.It is scheduled to be completed in about 18 months and will consider the establishment of another nuclear station in the southern part of the country — away from the coal fields.

CSO: 5100/5664

BRIEFS

NUCLEAR WASTE DISPOSAL--Cape Town--There was no safe and effective method of disposing of the nuclear waste that would come from Koebert annually, a University of Cape Town Academic said. Associate Professor Arnold Abromowitz of the Departmentof Psychology and acting chairman of Koeberg Alert said that among several major concerns with the development of the nuclear industry was the lack of adequate disposal. "At present there is not a single demonstrated safe and effective disposal method for such nuclear wastes in the world." An objective indicator of the status of the nuclear industry in the United States was the refusal by insurance companies to underwrite insurance against nuclear accidents. Professor Abromowitz said Koeberg was here to stay but what should concern every citizen was the emergency plan that Escom was obliged to produce and which was expected soon. [Text] [Johannesburg THE STAR in English 17 May 82 p 2]

CSO: 5100/5664

END

JPRS 81160

29 JUNE 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 150

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JPRS 81160

29 June 1982

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 150

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'HERALD' REPORT ON NUCLEAR FUEL RESEARCH

BK030955 Delhi NATIONAL HERALD in English 27 May 82 p 7

[V.H. Desai article: "How Well Can India Make N-Fuel?"]

[Excerpt] With the USA refusing to give nuclear fuel for the Tarapur plant, how is India placed to produce her own nuclear fuel? The answer is that we are really well placed. Indeed, we are among a select band of countries, and the only developing one among them, to have mastered the technology of the complete nuclear fuel cycle — from uranium exploration, mining, extraction and conversion, fuel fabrication, heavy water production, reactors and reprocessing of the spent fuel. Nuclear fuel production is an important part of the cycle.

As a culmination of the research work done at the Bhabha Atomic Research Centre, the Nuclear Fuel Complex (NFC) was set up at Hyderabad in 1971.

This unit has got the facility to produce ceramic grade natural uranium fuel for Candu-type reactors as well as to process enriched uranium fuel for the Tarapur atomic power station.

Nuclear fuel has two basic components — uranium oxide pellets and thin-walled zircaloy tubes. The different plants in NFC produce these two components starting right from the raw material.

On the uranium side, the "yellow cake" which is received from Jaduguda mines in Bihar is processed through a series of chemical operations for production of uranium oxide powder which is further processed by compaction and sintering for production of uranium oxide pellets.

On the zirconium side the zircon sand which is received from the Indian rare earths plant in Kerala is processed to produce zirconium oxide which is converted into zirconium sponge by magnesium reduction and further into zircaloy. The zircaloy ingots go through the process of extrusion for producing thin-walled fuel tubes and coolant tubes. The uranium oxide pellets are encased in zircaloy tubes and made into bundles which are used as basic fuel elements in nuclear reactors. The coolant tubes and calandria tube, which form the core of the nuclear reactor are also manufactured in NFC.

NFC is one of the very few places in the world where the entire process starting from raw material to assembly of fuel bundles is made under one roof. All the processes used in NFC are initially tried and perfected at the Bhabha Atomic Research Centre (BARC) and later transferred for production on an industrial scale.

NFC has also got a special materials plant where ultra high purity materials like tantolum, tin, indium, bismuth, gallium etc. are produced for application in the electronics industry.

As an important substitution measure adopted by the Government of India, NFC has gone into the production of seamless stainless steel and ball-bearing tubes. The seamless stainless steel tube plant has a capacity of 2,000 tonnes and can cater to a number of industries for fabrication of heat exchangers and other chemical operations. The ball-bearing tubes plant, with a capacity of 21,000 tonnes, can cater to the needs of the ball-bearing industry in the country.

With vast reserves of thorium, India has a good potential for developing fast breeder reactors which employ thorium as a basic raw material. In the fast breeder type of reactors, thorium oxide pellets are used as fertile material in the core of the reactor. A plant for fabricating components for the fast breeder test reactor coming up at Kalpakkam near Madras has also been set up at NFC.

To meet the needs of fuel for the new reactors coming up in the sixth plan, the capacity of fuel production at NFC is to be doubled to 200 tonnes per year for which additional facilities are coming up in the various fuel plants.

As a supplier of nuclear fuel, which is vital to the setting up of nuclear power reactors in different parts of the country, NFC occupies a unique position on the nuclear map of India.

Since radioactive materials like uranium are a health hazard the Department of Atomic Energy, which runs NFC, gives overriding priority to the conservation of the ecology of the areas. Prevention of air and water pollution are the paramount consideration.

There is a health physics division to monitor the pollution levels in air and water sources around nuclear installations like NFC and take preventive measures.

CSO: 5100/2187

MP QUESTIONS BENEFITS OF NUCLEAR WEAPONS DEVELOPMENT

Calcutta THE STATESMAN in English 13 May 82 p 8

[Article by Jaswant Singh]

[Text] IN 1964, with its nuclear tests at Lopnor, China announced its arrival in the nuclear world. For us in India, this news, though expected, had followed our traumatic military reverses of 1962. Since then, for almost two decades now, we have continued to live with the reality of a nuclear China. Recent missile tests by that country have also established its intercontinental launch abilities, a significant advance in the field. Yet, when the debate in India on our nuclear options hots up, it does not talk of China. Very largely, it confines itself to a deep concern about Pakistan's nuclear programmes.

Diverse views are held, antipodal in their extremes. Positions oscillate between India going nuclear being "immoral", and India not choosing to exercise this option also being "immoral". In this articulation of our concerns, we continue to discount the reality of a nuclear China. The nuclear might of neighbouring Soviet Union does not worry us and, despite the experience of the bewildering forays of U.S. Enterprise into the Bay of Bengal in the 70's, the nuclear arsenal of the USA does not cause us any concern either.

PAKISTAN

As in other matters, our worries seem to be centered on Pakistan. Ever since the late Zulfiqar Ali Bhutto spoke rhetorically of "eating grass" but "going nuclear", we have lived with that apprehension. Unattributable reports, most of them emanating from the West (this raises the very interesting question, what is India's own intelligence on the subject?), point towards the imminence of such a misadventure by our neighbour.

Two things need to be said here. One is a reality, however hard and unacceptable. Should Pakistan ever go nuclear, then there is no political leader (and I can conceive of no government in India) who would be able to restrain the groundswell of public opinion from launching the nation on this perilous, unchartered path. That is precisely why it is necessary to articulate this concern and to debate the issue. Secondly, we ought to accept that we just do not know enough about the subject. Most of our information is second-hand. Our reactions are not conclusions arrived at after a distilled analysis of the options available or the consequences of adopting one or another kind of policy posture. we alternate between grandiose sabre-rattling and "ahimsa".

We need to ask ourselves some searching questions. Would we still have nuclear aspirations if it were demonstrably established that there was just no possibility of Pakistan going nuclear? Or are we asking an independent nuclear status? If so, is it with a view to having a first-strike deterrence capability, or a reactive, residual, assured destructive ability giving us the "security" of deterrence? If the former, do we have the political will for it or are we, in the compelling phrase of McNamara, Bundy, Kennan and Smith, seeking the "acquisition of a weapons system solely for the purpose of preventing its use"?

Even that is subject to serious questioning. Because, of what relevance is the concept of ""deterrence" in our subcontinental context? Is it not axiomatic that such a restraint will apply only on the sane, the deterrable? On the other hand, if it is an independent nuclear capability that we seek, irrespective of what others (mainly Pakistan) may or may not do, have we sat down to analyse the diplomatic, economic, military and social consequences of it?

We have to begin at the beginning, for it is in that context that the relevance of our 1974 Pokharan blast lies. My view is that the Pokharan effort was an ad hoc, ill thought out, spur of the moment, act which has caused great harm to India and has not contributed a single positive gain to the country. It is my belief that, as a result of that needless explosion. India has lost a great deal. I am unable to comprehend even now as to what, if any, scientific advancement was achieved by that blast.

The ad hoc nature of the experiment is evident in our continuing to call it, misleadingly, a "peaceful" nuclear explosion. To be able to carry out the test in the summer of 1974, the decision to go ahead must have been taken in early 1972. That was a period of the culmination of the then Government's internal and external policies. Therefore, other than as an expression of a kind of national power symbol, I fail to find any other explanation for it. To call the test "peaceful", when until today we have not be able effectively to translate or even demonstrate any economic use for it, is to question everyone's intelligence. When the real advancement all over the world is in the field of electronics, it does not cloak our efforts to assert tangentially that Pokharan was an effort to keep up with the technological Jones'es.

As for diplomatic gains, if there were any, than they continue to remain pretty effectively disguised. It is open to serious questioning whether that blast helped us militarily or if it contributed in any manner either to our national security or served our national interests.

That egg, unfortunately, cannot now be unscrambled. So what are the options available to India? A study conducted has revealed that as percentage possibilities, after accounting for all relevant inputs, the chances of India going nuclear are as much as 53%, against 26% for Pakistan, Admittedly, this figure is as good or bad as any. It does, nevertheless, reflect the total capability of these two nations to adopt a nuclear course.

Before going any further, let me, very briefly, recount the possible compulsions for India embarking on this course. Such compulsions could cover within their ambit concepts like deterrence, the use of a nuclear weapon as part of the total defence arsenal, as an expression of India's "power" to influence and emphasize our regional, subcontinental, real-politik or even (though somewhat unconvincingly) our international status. And, finally, it could even serve as a reason from the purely internal national will or morale aspect. As an exercise towards the strengthening and advancement of a scientific, technological and and military momentum, the compulsions would be very difficult to bring under sharp focus.

QUESTIONS

What are some of the other question marks? These have now to be voiced, largely in order to create a concern as also to activate a debate. If ever we are called upon to decide, as a nation, we must know what we are doing. The very first query is whether our attempts at a nuclear cure are not worse than the ailment itself. Let me eleborate on this. We have blindly adopted the esoteric, nuclear mumbo-jumbo of the West, without pausing to relate it to the functional reality of this subcontinent. A colleague, in a highly perceptive remark, once observed: "Like China, India does not belong to the Third or any other world. It is a world of its own." Now, this is in fact not a boast. It is merely the recognition of a reality.

Of course, simultaneously, one has to concede that this whole convoluted nuclear question is an indication of the increasing complexity of conflicts between nation States as also of international relations. But for us the central question is largely derivative. Given a situation of economic (IMF, etc.) and armaments (Soviet arms, French aircraft, German subs. etc.) dependence, is an independent nuclear aspiration by India at all feasible? In an attempt to answer this as illustrative of what can be done, quite often China's case (as indeed that of France) is pointed out. Are these examples relevant? In finding an answer, the aspects of costs and technology acquire primacy. We have already accepted that ours is a dependent economy. When talking of nuclear weapons, one is not envisioning merely a Hiroshima-Nagasaki kind of a "crude" effort which could perhaps even be rolled out of the open doorway of a Boeing 737. We are envisaging a nuclear doctrine of "first strikes" and "deterrence".

India's nuclear capability would then comprise essentially our ability to hit targets of our choice first, or in retaliation. Assuming, hypothetically, that we cannot entirely discount China's existing nuclear ability, or Pakistan's aspirations, but are not taking into account the greater reality of nuclear super Powers (both in our ocean peripheries as also on the Asian landmass), then our effort becomes an attempt at joining the big league. We are talking in terms of at least an IRBM (Intermediate Range Ballistic Missile) capability. How else would you reach even the peripheries of our possible targets?

So we need a launch and a propulsion ability, command and control expertise, a surveillance system and a far more sophisticated intelligence than what we have now. There would then be the command and control costs. These are at the same time the most difficult and the most costly. The aspect of re-entry, even with Western technology, is quite often the most difficult aspect. With us the problems in this field appear almost insurmountable. If as a nation we are unable effectively to run our telephone systems, railways, buses or our public sector plants, how will we manage a nuclear arsenal?

DRAWBACK

This is not merely a facetiously expressed managerial concern. It translates itself into the totality of our cost concerns because of our proven inability to aggregate all the required environmental technology into the needed effort. From the Pokharan blast to the SLV-3, it has taken us more than seven years. That does not belittle the achievement of the space launch itself, significant as it continues to be. It is merely to point out the reality of the situation as it exists.

On the other hand, even if our aspirations are for the "crudest" of nuclear bombs, we would still need to deliver them in an effective kind of an aircraft which has speed, range, load capability, along with the ability to evade enemy interception. what do we have in that range and on whom are we dependent for it? Should, however, our efforts be in the field of rockets as delivery systems, then we would have to find answers to the problem of siting. If we site them on land, then we are faced with the possibility of their destruction by an enemy first strike even before we have got them off the ground. We really cannot consider the option of mounting them on our railway wagons and keep shunting them in the care of Indian Railways. The USA thought of this option until a wag quipped, "What if the wagons get lost?" So one has to start thinking in terms of a SLBM or a Submarine Launched Ballistic Missile. Here we are faced with the reality of of only just having to think in terms of manufacturing our own submarines and that, too, with German assistance. This, very basically put across, is what is often referred to as one aspect of the "escalatory effect" of nuclear aspiration.

Let us then take straight costs. Needing more money to spend on our nuclear effort, assume, for arguments sake, that we increase our defence spending from the present level of 4% of our GNP to 6%. That would perhaps enable us to have roughly double the present defence budget. Even that would hardly suffice. A study, recently made by the Centre for Policy Research, points out that between 1955 and 1980, France spent approximately $20 billion to achieve an independent but limited nuclear capability. During its current modernization programme, it will now be spending another $60 billion to achieve a capability of around 200 strategic launchers by about 1995. After discounting lower labour costs but taking into consideration the factor of a relatively weak industrial and technical infrastructure, the study suggests that it would cost us around $75 billion over a period of 15 years.

We all know that exercising a nuclear option does not obviate the continued necessity for conventional weapons. If one were to add, to our assumed nuclear costs, the continuing. routine conventional weapons programmes during the next 15 years, we may require of our people to spend a sum of around $150 billion. Please note that one is not taking into consideration the further "escalatory" effect of "parity" attempting to move to "dominance" so that the "window of vulnerability" is closed. Even if the figures are open to serious questioning, the fact remains—as tellingly pointed out in the study—that with that sort of money, "at present levels and at a very rough estimate, we could acquire 730 very high performance fighter aircraft, almost a 100 naval warships and, possibly, around 20,000 AFV's and 4,000 helicopters".

Despite all this, you could well argue that a great nation like ours could certainly put up with such costs. I am tempted to remark that, if we do decide that these costs are to be borne budgetarily, then without doubt the price shall have to be paid socially by us.

CSO: 5100/7099

BRIEFS

URANIUM RECOVERY FROM COPPER--CALCUTTA, May 17 (UNI)--The Jaduguda-based Uranium Corporation of India Limited (UCIL) a Department of Atomic Energy enterprise, has drawn up an ambitious expansion programme to recover uranium from copper tailings, according to an official document available here. Under the programme, the present uranium recovery pilot plant at Rakha would be replaced by a full-fledged plant, the document said adding that a similar plant would be established at Masaboni. The decision to set up two full-fledged plants was taken after the functioning of the pilot plants was found satisfactory, the document said. The programme includes expansion of the existing milling plant at Jaduguda to treat ore from the Bhatin mine. The Atomic Mineral Division (AMD) has completed exploratory work for setting up new mining and milling facilities at Nar Apahar and Turumdih, the document said. The UCIL exceeded the target of producing by-products including copper concentrate, molybdenum concentrate and magnetite during the last financial year from the sale of which it earned Rs 56 lakhs. The corporation earned a profit of Rs 63.02 lakhs during the last financial year as against Rs 50.40 lakhs in the previous year, the document said. [New Delhi PATRIOT in English 18 May 82 p 8]

CSO: 5100/7100

BRIEFS

SEARCH FOR TEST SITE--The Pakistan Government's bid to carry out an experimental atomic explosion on the Chinese ranges in Tibet has run into a snag. According to sources, negotiations with the Chinese leadership are said to have floundered. Now the Pakistanis are said to be desperately trying to choose between the limited number of sites in their own country. Their search has acquired urgency especially since intelligence sources have confirmed that Pakistan will have capability of a delivery system in the form of F-16s by 1983. [New Delhi INDIA TODAY in English 15 Jun 82 p 8]

CSO: 5100/5672

BRIEFS

XIZANG LITHIUM--Beijing, 18 May--Preliminarily verified lithium deposits in China's Xizang region account for nearly 1/2 the world's total, it has been learned from the Ministry of Geology and Minerals, Lithium, a type of metal with the lightest specific gravity, low fusion point, high boiling point and very high heat conductivity and absorption capacity, can be used as fuel for hydrogen bombs, rockets, nuclear submarines and modern jet planes. It can be widely used in the metallurgical, chemical, glass, ceramics, electronics and atomic energy industries. Occupying a very important position in modern-day science and technology, it is dubbed a "metal upstart." As early as the mid-1950's, the geological department of our country discovered lithium in the sediments of many salt lakes in Xizang. Beginning in 1980, it started regular work in salt lakes in northern Xizang. Some 600 samples were collected, laboratory tested and analyzed, thereby verifying that these salt lakes contained very high lithium ores with high industrial value. Moreover, it is fairly easy to extract and purify them. [Text] [OW180547 Beijing XINHUA Domestic Service in Chinese 0010 GMT 18 May 82]

CSO: 5100/2187

ATOMIC POWER USE REDUCES ENVIRONMENTAL POLLUTION

LD211328 Moscow TASS in English 1209 GMT 21 May 82

[Text] Vilnius, 21 May, TASS -- Atomic power development contributes to reducing atmospheric pollution and to improving the ecological situation. This conclusion has been drawn by the participants in the conference of the specialists of the CMEA member states. The conference came to a close today in Vilnius, the capital of Lithuania (a Soviet Baltic republic). They discussed the problems of radiological safety in connection with the operation of atomic power stations. The conference was attended by delegations of Bulgaria, Hungary, the GDR, Cuba, Poland, Romania, the USSR, and Czechoslovakia, representatives of the International Atomic Energy Agency (IAEA) and the CMEA secretariat.

Ivan Morozov, vice chairman of the USSR State Committee for the Utilisation of Atomic Energy, commenting on the results of the conference, told a TASS correspondent that summed up were the results of scientific and technical cooperation of the countries of the socialist community in implementing a programme to enhance the radiological safety of atomic power stations both for the attending personnel and for the population and the environment. The basic directions of this cooperation for the nearest perspective have been outlined.

Atomic power development, Morozov emphasized, will allow making the natural environment much healthier. The analysis of the experience in the operation of atomic power stations in our countries has irrefutably proved the safety of nuclear power industry. This is also eloquently illustrated by the results of the systematic study of the radioactivity of Danube River and the Baltic Sea. There is no increase in radioactivity in the basins of these water reservoirs for a long time in spite of the functioning of several big atomic power stations.

Cooperation in enhancing the safety of atomic power stations is of great importance in view of an extensive program for the construction of atomic power stations in the Soviet Union and othe CMEA countries, Morozov said in conclusion.

CSO: 5100/2187

BRIEFS

CSSR, USSR NUCLEAR COOPERATION--Prague, 17 May--G. Husak, general secretary of the CPCZ Central Committee and president of the CSSR, today received A.K. Antonov, deputy chairman of the USSR Council of Ministers, who is leading the Soviet delegation at the session underway here of authorized representatives of the two countries' governments on the implementation of the program of cooperation between the USSR and the CSSR in the sphere of the development of nuclear power in the CSSR through 1990. During a friendly talk they discussed the results and prospects of Soviet-Czechoslovak cooperation in producing equipment for AES's. G. Husak stressed that close cooperation with the Soviet Union in the development of nuclear power for peaceful purposes is of exceptional importance for Czechoslovakia. He expressed confidence that long-term cooperation and joint work in this sphere will develop successfully in the future too. [TASS report] [Text] [PM240923 Moscow PRAVDA in Russian 18 May 82 p 4]

CSO; 5100/2187

POLAND

NUCLEAR POWER DEVELOPMENTS, COOPERATION OUTLINED

Nuclear Power, Heating Plants

Warsaw PERSPEKTYWY in Polish 16 Apr 82 p 6

[Interview with engineer [Master of Science] Jan Kubit, plenipotentiary of the Minister of Mining and Power for nuclear power matters by Adam Hollanek, Sejm deputy: "Overdue Atoms"]

> [Text] With more than a 10-year delay, in respect to our needs, our government decided in January on the construction of the first Polish nuclear power plant. Why this happened and how the development of our nuclear energy will present itself is explained in our discussion with Master engineer Jan Kubit, plenipotentiary of the Minister of Mining and Power for nuclear power matters. Our interviewer, a Sejm deputy, has voiced for many years the necessity of making use in the power industry of "atoms in civilian life."

[Question] When did our energy crisis begin and what is it based on? After all, we have more coal than others.

[Answer] In the 1970's, an erroneous theory of economic planning was launched, which still lingers today: at first, it was the designing of facilities for the national economy whereas designing of the power industry was a secondary matter. This was as if though someone was creating an organism without taking into account whether he'll find the blood to give it life. As early as in the mid-70's, the economic organism started becoming deficient in this blood. Despite this, some national leaders publicly proclaimed the thesis about the surplus of our energy and about the need to use this power for export (for example, to Sweden by means of cables under the Baltic or to West Berlin). Therefore, the drastic energy restrictions have come as a great surprise to the public. Thoughtless delays in the development of the power industry can be made up, in my opinion, no sooner than in a matter of 15-20 years.

[Question] And are we now to take on, under such circumstances, the construction of the first nuclear power plant.

[Answer] It cannot be any other way. In the upcoming decade, we can achieve an increase in electric power production nearly exclusively from brown coal. However, the continued growth of the power industry from this source is limited by reasons of environmental protection and because of low industrial production of excavation machinery. It is not possible to even dream of oil and gas in terms of fuel for power plants. Nuclear fuel is the only remaining alternative. It [nuclear fuel] has no rational alternative under our conditions. An additional "threat" in this delayed matter is the fact that, in accordance with an agreement with the USSR, we are already receiving fuel which we, unfortunately, are not using. The amount of these supplies is equal to 18 million tons of hard coal. Our first nuclear power plant in Zarnowiec, in the voivodship of Gdansk, with 4 reactors with an output of 440 megawatts each will release 3 million tons of hard coal annually for export purposes. Its total power will amount to 1,760 Mw [megawatt], therefore, it will be greater than "Dolna Odra" or "Polaniec."

[Question] When will the current begin to flow from Zarnowiec and what will the future of nuclear power plants be in Poland?

[Answer] The first block of power should begin to move there at the turn of 1988-89. The next nuclear power plant will, most likely, be "Kujawy" which will already have reactors with a larger, thousand-megaton output. This construction will initiate a new phase of our nuclear power industry, which will be based on the application of, henceforth, typical, unified design solutions with four reactors of 1,000 hegawatts each. Similar giants (their total output being four thousand Mw) are already being installed in the USSR and in other CEMA countries.

[Question] How can our energy needs be summed up? How much of this energy will be needed by the economy up to, let us say, the year 2000?

[Answer] According to preliminary assessments, nuclear power plants with a total output of 25 thousand Mw ought to be installed in Poland to balance fuel-energy needs until the end of this century. This means twice as much as the present total operational output of the country's power industry. However, this does not seem realistic to me. Our true potential is estimated at about 15 thousand Mw which according to 1980 prices would cost about 600 million zlotys at least. Naturally, the public would have to accept such a great investment effort.

[Question] Why will the first power plant be situated in Zarnowiec?

[Answer] Because a pumped-storage hydroelectric power plant with a power of 680 Mw has been built there. Up to the time that the nuclear power plant is on line, it has to be supplied with power from the existing power main; for the time being power will be obtained from the "Dolna Odra" power plant and from Kozienice from which, however, an electrical supply line with a voltage of 400 kv has to be extended to Zarnowiec. The power losses as a result of this transmittal of energy amount to over 20 thousand tons of standard fuel (coal) annually. However, during peak periods, these losses and expenses pay off since the power, in short supply, flows from the pumped-storage power plant to the country's power main. The merging of this power plant with the nuclear power plant will increase the profitability of this kind of solution.

[Question] Where will we obtain the installations for this and the next nuclear power plants?

[Answer] From the Soviet Union. A working design is being developed there; that is where the technology and the construction of basic installations comes from. The USSR also assures us, as I have mentioned, supplies of nuclear fuel.

[Question] In many Western countries, especially in areas where nuclear power plants are to be built, the public is protesting against such structures. Thus, does a nuclear power plant expose the public to some sort of risk?

[Answer] This is where I must, regrettably reproach the press for informing about these matters incompetently. The well-known protests of Western society dealt with the building of nuclear power plants with considerably simpler construction than those in the Soviet Union. The other structures are cheaper and steam comes into the turbines, which power generating equipment, directly from nuclear power processes. The Soviet Union has dual systems of water circulation, thus the danger of direct "leaks" of radioactive substances from reactors is minimal. Besides, by strictly adhering to the safety code, which pertains to the operation of nuclear structures--those used in the West as well--there is no justification for fear. It is worth reminding here about the great superiority of nuclear power over the traditional one which pollutes and destroys man's natural environment. Nuclear power plants do not require extensive areas of land. They do not need space for fuel storage or buried waste. They do not pollute the air, with either dust or sulfur dioxide.

[Question] Does this mean that if nuclear power and heat generating plants were to be built in large urban centers instead of the traditional ones of the "Leg" type in Krakow or "Siekierki" in Warsaw, that there would not be as much pollution in these areas as there is presently?

[Answer] Indeed, besides nuclear power plants, a system of nuclear power and heat generating plants ought to be created. There are two methods of producing heat for large population centers poisoned by industrial fumes. The first method is the installation of low-pressure nuclear heating plants in the area of the urban centers themselves; such heating plants have reactors with a 300 to 500 Mw capacity. The second solution is based on the construction of nuclear power and heat generating plants with 1,000 Mw reactors and the use of heat-generating turbines. I will not go into detail here. In the summertime, these turbines supply current to the electric power main and heat for the city in the winter. Thus, the production of electric energy becomes a supplementary matter. Such a solution would be totally justifiable for Krakow, Gdansk, Slask as well as Warsaw. I am a fervent supporter of the development of the heating plant system based on nuclear fuel. Unfortunately, so far, such solutions are not being planned in the country, even though, they would be very useful.

[Question] How about in other CEMA countries?

[Answer] Heat-generating installations based on nuclear fuel are being built in the USSR and in Czechoslovakia where heat-generating reactors are also produced. We are behind in this respect as well. There are opportunities of establishing coproduction in this field as well; I feel, however, that this can be started no sooner than after 1990.

Soviet-Polish Cooperation, Coproduction

Warsaw KURIER POLSKI in Polish 23-25 April 82 p 3

[Article by Zenon Budny: "Atomic Debut"]

> [Text] For the time being, it is an empty field and Castle Hill [Zamkowa Gora] which is stripped of trees and rises nearly 100 meters above the surface of Jeziorno Zarnowieckie. This site has been waiting for its fate for 10 years. It is precisely here, at a distance of 22 km from Wejherowo and in the vicinity of the pumped-storage hydroelectric power plant "Zarnowiec" that the Polish debut in the nuclear power industry will take place. The ceremony of laying the cornerstone is planned here this month.

In August 1971, the state Presidium made a decision regarding the building of a nuclear power plant with a deadline of 1984-85 in which it should be placed in service. A year later, the location was determined to be in Zarnowiec. Then, a long interval took place--precisely speaking--10 wasted years. Successive deadlines for beginning the work passed while building preparations never went beyond the stage of paper agreements.

Why the delay? After all, the 1970's were a period of expanding investments and the forcing of industrial giants. Unfortunately, the nuclear power plant lost the duel with "Huta Katowice" [Katowice Steelworks], with "Berliet," "Fergusson," the small "Fiat" and color television. There was the preponderance of opinion that Poland, which is rich in coal, does not have to hurry with the nuclear power industry. The fact that a considerable portion of installations and fuel have to be imported, significantly dampened the enthusiasm of decision-makers. A total collapse of our power industry was necessary before it was obvious that things could not be put off any longer.

Scholars warned.... In numerous experts' reports and proposed programs, reference was made to the iron law of economics, which stipulates that a country which wants to develop normally, must double the power of its electric power plants every 10 years. It was to be expected that sooner or later, the country's energy needs would begin to grow at such a rate that traditional electric power plants would not be able to keep up with the generation of electricity. Experience has proven the validity of these predictions and very quickly--sooner than might have been expected.

Uranium V Coal

[Question] What considerations speak in favor of building an "atomic power plant"?

[Answer] Actually, we still regard ourselves as a major worldpower of coal production, however, it is an open secret that our mining industry is undergoing numerous difficulties; excavation costs are growing; it is necessary to excavate increasingly deeper coal beds. Coal has increased significantly in price on world markets and it is a known fact that at the present time, it is our main source of foreign-exchange, therefore, whether we want to or not, we must strive to maximize its export. In general, the fuel situation is bad because oil and gas prices have also risen to unprecedented levels. All of this together forecast the growing profitability of nuclear power plants.

The fact alone that the nuclear power plant in Zarnowiec will make it possible to save 3.5 million tons of coal annually, speaks in favor of its rapid construction. After all, the ability to become independent of transport is of no small significance either: here an entire year's supply of fuel can be delivered by several trucks while the traditional power plant entails a dozen or so trainloads of coal daily! The costs involved? A ton of nuclear fuel is, in truth, 30,000 times more expensive than a ton of coal, however, it supplies 100,000 times more power. No matter how one looks at it, it is profitable.

In addition to this, there are also immeasurable advantages, as for example, considerations involving the protection of the natural environment. When coal is burned, especially low grade coal, large amounts biologically harmful substances are emitted. Desulfurization of exhaust gases is very costly; the method of removing nitric oxide remains to be solved. On the other hand, a nuclear power plant does not pollute the air the slightest degree!

All of these arguments have settled the issue once and for all.

Before the Reactors Stop

In the middle of last year, deputies from the Sejm Commission for Mining and the Power Industry took an aggressive stand. A desideratum to the President of the Council of Ministers was passed in this regard demanding that quick decisions be made in respect to the building of a nuclear power plant and urging the necessity of taking on this venture. On 18 January of this year [1982], the State Presidium made things perfectly clear.

Shortly after, Zarnowiec was visited by the minister of Mining and the Power Industry, General Czeslaw Piotrowski. The venture gained momentum daily. Work brigades of the Gdynia Enterprises for Electric Power Plant Construction and the Industry of "Energoblok-Wybrzeze" have already moved into the 200-hectare area of the future power plant by carrying out ground-levelling operations. It will be necessary to move over 25 million cubic meters of earth by, among other things, levelling off Zamkowa Gora and filling up about 40 hectares of the lake water area.

The first in line will be preparations for the building of facilities: it will be necessary to build access roads, railroad side lines, a water treatment station, a sewage treatment plant, a pumping station, etc. The northern section of "Zarnowiec Lake" will be blocked by a dam while a canal, about 120 meters in width, will run along the eastern shore to bring in and carry off water for cooling.

The construction of the power plant in Zarnowiec will cost about 45 billion zlotys. This is a lot; an awful lot. However, this expense will be spread over a period of many years. Two blocks of 440 megawatts each will be ready for use in 1988 at the earliest and most likely, a year later.

Without Fear

It is not just recently that we have been reading world news reports about protests on the part of nuclear plant opponents in, among others, Austria, Sweden, FRG, and many other countries. Their concern is for the threat to safety; a vision of nuclear annihilation which can be caused by pure accident. Now, in connection with the construction in Zarnowiec, this is becoming a live issue in our country as well, therefore, it is worth clarifying. Does a nuclear power plant really present any kind of danger to the people and the environment?

Experts do not harbor any fears. A reactor cannot, under any circumstances, become a nuclear bomb; this is a physical impossibility. Therefore, the so-called, Hiroshima complex has no justification here, whatsoever. A remote possibility exists that the cooling system pipeline could break or that the core will succumb to melting and that radioactive substances could escape into the environment. However, this is only a theoretical possibility. Reactors are equipped with numerous, independent of each other and automatically activated backup cooling systems. If only one of these systems works, then the core will always be cooled and cannot melt. Even if all the systems were to fail at once, the radioactive substances would still not escape into the environment because the entire reactor is sealed within a leak-proof protective casing--a reinforced-concrete or steel shielding which is capable of withstanding a pressure of several thousand atmospheres. The chance of failure is, therefore, nearly nonexistent.

We have to admit that scientists have a truly crowning argument up their sleeve in the defense of their reasoning: thus during the last 2 years the nuclear power industry has not had one fatal accident worldwide in a power plant reactor.

How do things look as far as plans for Zarnowiec are concerned? This will be a thermal type power plant, with enriched uranium, Type WWER-440, Soviet reactors will be used here. They are equipped with the newest safety systems and placed in special casings with sprinkling systems and water condensors.

Where safety concerns enter into play, there is no room for any kind of doubts or ambiguity. Maximum caution is the obligation of designers. That is why, extremely thorough studies of hydrogeological, geological, meteorological, etc., conditions have been conducted in the region of Zarnowiec. A model of the lake was built in the laboratory and a study was made of the methods of distributing the warm stream in the reservoir in such a way so as not to disturb the thermal equilibrium of the water area. Seismological tests were even conducted, even though underground tremors are not registered in this area but...just in case. The system of radiological protection was worked out point by point. A so-called, sealed or protective zone was created around the power generating plant.

Among the residents of Wejherowo and surrounding areas, the nuclear power plant is, of course, the number one topic of discussion. However, one does not hear of anyone in this area who would have feelings of apprehension about this investment venture. From Kartoszyn, a village situated at the foot of Zamkowa Gora, several farmers have moved away, not from fear of a nuclear disaster but simply because their land was situated in the area of the fiture capital construction. There are people still living on eight farms but they too will move any day now. In any case, the land will not go to waste--300 thousand cubic meters of rich topsoil, taken off during ground-levelling operations will be utilized elsewhere.

And what about waste from the power plant? There will not be much of it but regardless of the amount, such refuse cannot be thrown out onto the dump pile or into the nearest pond.... The safest depository for radioactive waste are deep, abandoned salt mine pits. It is in such underground chambers that unsafe waste material will be stored.

From Domestic Factories

If public safety and that of the environment do not raise any concern, then there exist real reasons for concern of another kind: will not this investment venture make us dependent on importand will it not create an avalanche of foreign currency expenses?

Fifth percent of the power plant in Zarnowiec will be equipped with Polish installations. Fuel will be supplied by the USSR. But we are also conducting our own exploratory search for uranium with the hope that it will be successful.

In 1979, a coproducer agreement was signed by CEMA countries comprised of multilateral specialization and coproduction as well as mutual deliveries of equipment for nuclear power plants. This agreement defines the range of products and delivery deadlines. A portion of these tasks has been assumed by Polish industry. Such basic installations as pressure stabilizers, steam producing equipment, turbines, selected fixture elements, control-measuring device systems, backup generating units and others are produced or will be produced domestically both for domestic needs as well as for export purposes. Such well-known plants as Rafako-Raciborz, Fakop-Sosnowiec, Chemar-Kielce, Metalchem-Opole, Zgoda-Swietochlowice, Konstal-Chorzow and many others are involved in their production.

Therefore, we are not entirely condemned to import and owing to the reciprocal exchange [of equipment], foreign-exchange expenses should not be heavy. However, there does exist an indispensable condition: the high quality of this product. In the construction of installations for nuclear power plants, there can be no talk of any kind of defects or incomplete work. This awareness must accompany all manufacturers from the initial moment of the nuclear debut.

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CASTRO MADERO ON RIGHT TO DEVELOP NUCLEAR SUBMARINES

PY120243 Buenos Aires TELAM in Spanish 1720 GMT 11 Jun 82

[Text] Buenos Aires, 11 Jun (TELAM)--Vice Adm Carlos Castro Madero, chairman of the National Atomic Energy Commission [CNEA], stated today that because of the use of nuclear energy by Great Britain for military purposes, Argentina will be free in the future to develop a nuclear submarine without violating any previous commitments. The CNEA chairman made these remarks to Radio Rivadavia from Vienna, where he is participating in the meeting of the International Atomic Energy Agency [IAEA].

He added: I asked and demanded from the IAEA a decision on whether it considers legal the use of nuclear submarines by a nuclear power against a nonnuclear country, a country which has everything under safeguards, which has fulfilled all its commitments not to use atomic energy for military purposes. Therefore, he added, in view of the profound inequality in the conflict, as of now, in the future, my government reserves for itself the right to also develop the euphemistically so-called nonproscribed nuclear activities.

Castro Madero added that this does not mean that Argentina is going to begin the production of nuclear weapons. I explained, he said, that it has nothing to do with nuclear explosives, but in this particular case, the development of a nuclear powered submarine. I presented the problem in the sense that the line which divides peaceful use from military use has been moved and it is no longer well-defined now.

Asked about the impact of his warning on countries which deal with the issue of nuclear energy, he stated that the first reaction was of support from the Latin American group. They demanded that my declaration be declared an official document.

He added: I noted great concern in many highly industrialized nonnuclear countries which really see the danger. The director general has viewed the subject as one of great importance and decided to engage immediately in a study to give me a clear answer to all the problems I presented.

Castro Madero concluded that the Argentine position has been very clear: and I believe that this is going to force the IAEA to review many ideas.

CSO: 5100/2189

BRIEFS

BUDGET CUT AFFECTS--Mexico City, 19 May (NOTIMEX)--The official spokesman for the Federal Electricity Commission, Eduardo Betancourt, reported today that budget cuts for some government projects will not affect work at the Laguna Verde nuclear plant. Betancourt said the first unit at Laguna Verde will begin operation in mid-1983. The plant is now 73-percent complete and 6,000 workers are working daily on it. Betancourt's statement refutes reports to the effect that Laguna Verde would be left unfinished because of budget cuts. It also refutes an international news agency report to this effect. [Excerpt] [FL200018 Mexico City NOTIMEX in Spanish 2350 GMT 19 May 82]

CSO: 5100/2187

SOURCES VIEW PAKISTANI, IRAQI NUCLEAR CAPABILITY

TA271912 Jerusalem Domestic Television Service in Hebrew 1815 GMT 27 May 82

[Text] Reliable Western sources have told our defense affairs correspondent Ron Ben-Yishay that Pakistan has reached the stage where it can conduct a nuclear test any time it wants to. If it carries out a successful nuclear test Pakistan will join the group of countries enjoying a nuclear-military capability, such as India.

However, unlike Pakistan, Iraq has so far failed in its attempts to rebuild the nuclear reactor near Baghdad that was destroyed in the Israeli Air Force raid a year ago. Ever since then, Iraq has been trying to renew its nuclear cooperation agreement with France but so far President Mitterrand has refused to sell Iraq enriched uranium suitable for the production of a nuclear bomb. The negotiations between the Governments of France and Iraq over this continues, according to the sources.

Our correspondent reports that since the nuclear reactor was destroyed on the eve of the Festival of the Tabernacles last year the installation has remained completely paralyzed and no one is working there. The Iraqis are now trying to promote their nuclear bomb plan by hiring scientists from the United States and Western Europe.

Our correspondent points out that the head of the IDF intelligence branch, Maj Gen Yehoshu'a Sagi, said in a newspaper interview some time ago that the attack on the Iraqi nuclear reactor did not eliminate the nuclear danger to Israel, but merely postponed it to the 1990's. He added Israel faces a nuclear danger as long as there is an infrastructure of nuclear scientists and researchers in Arab countries.

CSO: 5100/2187

NUCLEAR ENERGY DEVELOPMENT ISSUES DISCUSSED

Jerusalem INNOVATION in English No 78, May 82 pp 1-2

[Text] The construction of a nuclear electric generating facility, somewhere in Israel, has been on the agenda for more than two decades. Even before the oil price crisis, imposed upon 'the world by the OPEC cartel, many of this country's economic and scientific leaders were on the record, as favoring the construction of at least one atomic power plant.

The matter again was brought to the public's attention by recent statements by the Minister of Energy and Infrastructure, that the acquisition of such a station now seems more practical, than in the past. Negotiations are said to be in progress with several potential suppliers.

That Israel has not yet embarked on such a project is due to several causes. One of those is political: every government here has refused to acceed to the international treaty against the proliferation of nuclear arms. Israel has absolutely no confidence in the International Atomic Energy Agency's ability to monitor that treaty's implementation, and cannot agree to make its facilities accessible to representatives of an organization that is largely under the control of its sworn enemies.

However, it must be stressed that this stand is not motivated by any opposition to the non-proliferation treaty's declared objectives: Israel has long been on the record against the use of nuclear arms and pledged not to be the first to introduce such weapons to the Middle East. Notwithstanding frequent rumors, reported in the world press at the likely instigation of hostile sources, there is no hard evidence at all that practice on this point here varies from that principle.

Another issue is that of security. In Israel, nuclear power raises more questions than elsewhere: here accident is not the only source of danger. The country has been at war for more than three decades, most of its neighbors refuse even to think of peace and international terror organizations want to destroy it. What would happen if a reactor were bombed from the air, or attacked by terrorists is here a very immediate concern.

There also have been some weighty practical problems. One of those is price: Israel cannot lightly undertake the construction of a facility which will cost upwards of a billion dollars. Foreign aid, which could help overcome this difficulty, has not been forthcoming until now.

Another question, which time and again delayed proposals for a nuclear power station, has been the lack of a suitable site: the sea shore location, essential because of the need for massive quantities of cooling water, have been found eminently unsatisfactory.

Geologists were the first to point out the difficulty. Their research showed that the area experiences significant earth quake activity: large parts of the ancient town of Caesarea now are deep below the surface of the Mediterranean, while sea shore hills far above the water show evidence of having been submerged within the last few centuries or millenia. Quite obviously, an atomic reactor must not be placed in such a volatile environment.

The interrelated question of plant location and cooling water may now be nearing a solution. Construction of a Mediterranean–Dead Sea canal during the 1980s (see *INNOVATION 62*, January 1981) will bring a large volume of such water to suitable areas in the Northern Negev and in the Judean Desert. Far from population centers, those may be the best sites this country ever could find.

At the same time, there seems to be a possibility for Israel to be at least partly independent of any outside nuclear fuel supply. Significant quantities of uranium are available in the phosphate rock mined here by the millions of tons; there also have been reports of economically feasible methods for its extraction from that source.

Many proponents of nuclear energy here now insist this country build such stations, even if negotiations for their purchase remain without result. Israel, it appears, already has an adequate supply of scientific and engineering manpower, to embark on such a project. Two research reactors have been working for more than two decades and there are also a number of Israelis who worked on such projects in other countries. Going it alone has its attractions, but most likely would exact a heavy economic price.

Whether all those proposals, possibilities and likely solutions to existing problems actually will result in a nuclear generating station in Israel, in the near future, remains an open question. Public opinion here is far from certain the likely benefits are worth the risk; as in other lands, here also atomic energy arouses deep seated atavistic fears, which may yet prove to be decisive.

CSO: 5100/4723

BRIEFS

NO HURRY ON AGREEMENT--President Shehu Shagari said in Lagos yesterday that Nigeria was not in a hurry to sign the "Nuclear Energy Safeguard Agreement" of the International Atomic Energy Agency (IAEA). He told the Director-General of the agency, Dr. Hans Blix, who paid him a courtesy call at the State House that Nigeria could not sign the agreement now 'because we have not developed anything". President Shagari, however, assured the Director-General of Nigeria's support for the agency in its efforts to promote safety in nuclear energy development. Alhaji Shehu deplored the role of some Western countries in aiding the development of neclear energy by the racist regime in South Africa. The situation now posed a threat to Africa and must be countered, he said. Earlier, Dr. Blix commended Nigeria for promoting disarmament and for signing the Non-Proliferiation Treaty. [Kaduna NEW NIGERIAN in English 19 May 82 p 16]

CSO: 5100/5673

NATION'S NUCLEAR POLICY DESCRIBED AS 'CALCULATED AMBIGUITY'

Johannesburg THE STAR in English 24 May 82 p 24

[Paul Moorcraft in "Counterpoint" column: "Irony Goes Nuclear"]

[Text] In an expanding world of nuclear weapons, man's history could become a short trudge from Adam to atom. If the nuclear powers ever rolled the cosmic dice, Darwin could be put into reverse: Mother Earth could become a planet of the apes again.

Maybe parts of the southern hemisphere could survive — Argentina, South Africa and Australia — if the atomic armageddon mushrooms over northern Europe.

Today the action is in the south, however. The battle for the Falklands is spearheaded by a Royal Navy which is nuclear armed.

As in 1914, the world could blunder into World War 3 despite or because of the present nuclear balance of terror. Six nations definitely possess the bomb, at least two others probably have it and by the 1990s perhaps a further 20 countries could grasp the nuclear nettle. And then add the mad-dog groups such as the Red Brigades or madmen like Gaddafi who are panting to steal or buy one ready made.

Will Pretoria join the nuclear weapons club, especially if the present six members become 26? The President's Council has advocated a De Gaulle presidency. The real De Gaulle used his presidential autocracy to forge ahead with a nuclear deterrent as a symbol of French will and independence. So after a Boer De Gaulle, an Afrikaner bomb?

Like Israel, South Africans could build the bomb. Pretoria has the technology and perhaps the incentive, although an open confession to having one would put the UN in a frenzy. The demand for comprehensive sanctions would be irresistible. And except for a massed Cuban-and Russian-backed invasion where would such a weapon be targeted? (Would a few A-bombs have helped Ian Smith?).

Even hints of a bomb have drawn rapid condemnation from both Russia and America. In 1977 they moaned to high heaven about a "test centre" in the Kalahari and in September 1979 when a Vela reconnaissance satellite detected a tell-tale double flash in the vicinity of South Africa.

To Pretoria such criticisms were just a flash in the scan and said it was all rubbish. But perhaps atomic testing is just like devaluation. you go on swearing you'll never do it — until you do so.

Pretoria's policy of calculated ambiguity over nuclear matters is impressive, especially compared with the main plank of its foreign policy, the intellectually constipated alliance of casino-states. Pretoria has given just enough hints — perhaps the Kalahari "test" was intended to be discovered — to suggest that a South Africa with a bomb in the basement should be taken more seriously by the West. Pretoria could not have missed how the Nato powers were bewitched by the bomb-waving Charles de Gaulle in the 1960s.

Because men like Jimmy Kruger or Dr Munnik have not been allowed near the defence portfolio, NP politicians have not been bombastic about the bomb (if it exists). Heaven forbid that we should hear: "It would cost us only R20 a month each to be able to donder Moscow . . . The Russians are slow thinkers, you know . . . Their threats leave me cold . . . We would only shoot out a few windows in Moscow, etc, etc."

No, the cool, sophisticated, ambiguous denials have established precisely the correct ambience for an effective strategy of "deterrence by uncertainty."

But, *in extremis*, Pretoria might openly go nuclear; that is the eventual logic of the present garrison state mentality. Why shouldn't South Africa arm itself with the weapons that its enemies (and friends) flaunt with so much macho even though the UN would shout about the Republic's Masada complex

A South African bomb is no crazier than a French one.

Yet it is indeed a strange irony that the nations that fought an insane Hitler to the last bunker should come to rely upon a convoluted theory of deterrence which makes their survival (and everybody else's) dependent upon the rationality of all the future leaders (including the Amins) in all the increasing number of nuclear powers in the world.

Whether Pretoria joins the club or not, the Atomic Age is here to stay — but are we?

CSO: 5100/5669

WASTE PROBLEMS DETERRING FINNS FROM BUYING FRENCH N PLANTS

Helsinki SUOMEN KUVALEHTI in Finnish 4 May 82 pp 64-65

[Article by Mirja Bolgar: "Finland Interested in French Nuclear Power, But Not in Nuclear Waste"]

[Text] France's ambitious nuclear energy policy is already so firmly established that a change in governments or presidents is not able to change it to any perceptible degree. An illustrious history since the times of Joliot-Curie: the first patent for a French nuclear reactor was applied for in 1939, de Gaulle established the Atomic Energy Commission (CEA) in 1946, and now in 1982 there are 30 power plants in France and almost as many are under construction, 28.

Of these 30 reactors the majority is made up of presurized-water reactors either of the 1,300 or 900 megawatt type. The latter interests us Finns and it is being produced in France already on a series basis by Framatome, Alsthom-Atlantique, and Creusot-Loire. If the proportion of electricity produced by nuclear power plants is taken into consideration among the energy programs of the various nations, France is at this time number one: last year it produced 38 percent of its electricity in nuclear power plants (Finland 17 percent). It also received the lion's share of foreign orders for reactors, one more than Japan. The defects in previous models have been eliminated, the new models are in the opinion of the manufacturers more secure, and maintenance is easy.

France's nationwide network belongs traditionally to the nationalized electric company, EDF (Electricite de France), which works in cooperation with the Atomic Energy Commission (Commissariat de l'Energie Atomique). The joint engineering office of both these institutions, Sofratome, is at the present time conducting a study with Imatra Power on the feasibility of a 900-MW power plant (PWR) under Finland's conditions. Imatra Power is conducting a simultaneous study with the Soviet agency, Atomenergoeksport; the research phase will probably last until the end of the year and decisions will not be made until after it is completed.

Small Finland and big France are poor in raw materials for energy -- France does, indeed, have some uranium, coal, and gas, but it must still import the majority of its energy from foreign countries: a 130-billion franc "mill-stone" last year. Giscard d'Estaing's trip to Finland in the summer of 1980 gave impetus to the nuclear power project between our countries, and most probably it is was given additional hope during Francois Mitterand's short visit in April.

A Compromise for the Opponents

French plans experienced a slight setback last summer. The ecologists were promised before the elections that not everything will be placed in a dependency on nuclear power. Some power plant projects will be put on ice temporarily -- such as the Plogoff project in Bretagne, which had to be abandoned because of violent opposition from local farmers and fishermen.

The arguments of the ecologists: no power plants in densely populated areas, no large breeder reactors or treatment of radioactive waste -- "we do not want to be the world's trash can!". There are cleaner forms of energy such as the sun, forms that provide more employment such as coal; the wind and the ocean can be used for purposes other than guiding leaky oil tankers to the shores of Bretagne or sinking waste cylinders into the sea.

The government mobilized all its experts to study these protests and animated discussions were held in nationwide meetings. Nevertheless, in a surprisingly peaceful manner all the parties supported the use of nuclear energy with only slight differences in emphasis. The Socialist government, which has created its own Energy Ministry, was able to find a conciliatory solution to a delicate situation: the pace of construction was slowed down by one-third. For the time being, a green light is being given to three new power plants in a year; after this year new projects will be implemented according to the situation and need.

Conservation measures were also emphasized: the consumption of costly oil, which swallowed up nearly half of last year's total need, will be reduced to approximately one-third (70-75 MT) by the year 1990. The production of coal will be increased slightly for reasons of employment even though in the overall consumption of energy its proportion will decrease (to 15-16 percent). New sources of energy are being studied with rather modest results: in the year 1990 it will be only 4.5 percent of the total need, but over the long haul, after 20-25 years the picture will be quite different.

Even though gas will also be imported from the Soviet Union (a controversial project since evergy independence is a goal), it is expected that nuclear energy will unconditionally provide the most energy: in 1990 production will be more than threefold that of present production. France wants to be self-sufficient with respect to energy.

Waste Is a Problem

What kind of power plant do we Finns need? What will be done with the radioactive waste? To what degree can we ourselves participate in the construction of a power plant? Are we able to pay, is the equipment safe? I went to the CEA in Framatome and to the EDF to ask about these matters.

In CEA's information section I immediately presented them with the most delicate question: What will we do with the waste? If we purchase a French nuclear power plant, we will not be able to ship the waste on a train to the Soviet Union.

It is clear that the owner of a power plant also owns the waste, was the answer. We can have the waste retreated in France or vitrify, "encapsulate". it into cylinders -- I was shown miniature models, a substance what felt and in color looked like black obsidian -- then they are sent back to the owner country in stainless steel packages. (Smaller amounts of radioactive waste can be retreated in breeder reactors.)

The waste also becomes a part of the glass shell, and if the cylinder is buried deep into the ground, it dissolves and over a certain period of time it loses its excessive radioactivity, but this takes several decades.

Approximately 3 cubic meters of waste are accumulated annually from the operations of one 900-megawatt PWR power plant. If France is to treat the waste from Finnish power plants, naturally, a separate agreement must be concluded.

In Framatome's headquarters in the Defense skyscraper satellite, which is called the Manhattan of Paris, I met with commercial director Andre Touchard and press attache Marie Allozen.

Framatome was established in 1958 and it built the first Belgian-French unit in 1961 already.

[Question] What would be the Finnish share of the project if the reactor transaction becomes a reality?

[Answer] The skill and expertise of the engineers in Finland are of the highest level. This already became apparent from the questions they asked in the negotiations: they know what they are doing and what they need.

Since the feasability study is still in progress, I can only say what the Finns are asking of us. Imatra power is asking for a bid form Framatome on the nuclear portion of the reactor (NSSS = Nuclear Steam Supply System). Imatra Power has also asked Alsthom-Atlantique to submit a bid on certain conventional portions of the equipment (turbines, among other things). It is awaiting a bid on the fission material from Cogema and on the fuel from Framatome. Thus Finland is not purchasing a complete power plant from France, only those components which the Finns themselves cannot build.

Thus Finland's own share would be significant. Imatra Power is inquiring into corresponding components from us, components that it once purchased from the Soviet Union (Loviisa); since it has been able to build the remainder of the equipment on its own, it will, naturally, not expect the French to do this. But negotiations are also being conducted with France on specialists needed to install the NSSS.

[Question] Does France have any experience in these types of transactions?

[Answer] We have sold 900-MW pressurized-water vessels to Belgium, complete power plants to Korea as well as to South Africa and Iran even though the latter transaction did not go well due to political reasons. We have also been requested to sell two NSSS to Taiwan.

[Question] Are your prices competitive?

[Answer] In Belgium we competed with the Americans and the Germans. As far as quality is concerned our prices were competitive. Of course, in making an evaluation the operational time must be taken into consideration (for example, in the first year 5,000 hours, in the second year 6,000, and so on). Economic experts calculate the life span of a reactor to be approximately 25 years, but pressure vessels have been designed for 40 years.

[Question] And a guarantee?

[Answer] The assembly guarantee is, of course, shorter. We will guarantee our own calculations; a guarantee for the whole system is, of course, always shorter. Only a year or more. This can be negotiated.

[Question] What about maintenance?

[Answer] France is prepared to undertake this for years. We are continuously manufacturing tools and instruments for inspecting power plants, finding and correcting defects. We are prepared to provide services for all countries which purchase Framatome's reactors. Of course, the builder himself knows best how to correct defects.

[Question] Are you optimistic about France's nuclear future?

[Answer] Yes, we want to succeed.

Examples From Imatra Power

What was the situation in EDF? There I presented questions to Maurice Magnien, director of the research section. He had a considerable amount of positive experience in cooperation with the Finns in the development of our electricity network from 30 years ago already. "When I go to Finland, it is like going home," he states.

"It is normal that Finland turned to France in issues concerning nuclear energy. The Finns understand the background and the history of this issue; we have now reached a stage of maturity, we have scientific-technical competency, an ability to convert uranium into fuel, and more than 10 years of experience in present pressurized-water reactors.

The Finns are seeking from France a different type of reactor knowledge than they already have. They already have a firm understanding of a nuclear energy future on the basis of the Soviet-type power plant in Loviisa and the Swedish-type power plant in Olkiluoto. We place much value on this cooperation for the reason that the Finns are so well informed on these issues.

"The Finns will be able to receive information concerning the construction of reactors and general and detailed research materials from us. We can also compare French and Finnish safety standards and deliver to Finland the special equipment it will need. Just as two automobiles drive differently, there are differences in the operations of reactors; wear, expenditures, maintenance, regular inspections, and so on depend on them."

[Question] Do Finland's strict safety standards correspond to French standards?

[Answer] In the long period of France's atomic history there has not yet been one single accident. The small crack in the Fessenheim Power Plant was repaired and it did not cause any harm to the environment. The reactor is once again operating safely.

The double feeding of fuel has been found to be satisfactory in France. If precautionary measures and emergency channels are increased, prices will, of course, increase somewhat. Finland intends to obtain three feeding mechanisms -- if one fails, there will be two in reserve. Nothing according to my understanding will stand in the way of this objective. There are countries which have even requested quadruple systems.

In the price calculations for electricity Director Magnien assumes a life span of 30 years for a power plant. One nuclear energy kilowatt will thus cost a producer 18 centimes, with coal it would be double. Electricity produced by oil is the most expensive, a full 55-60 centimes.

He also stated that the French intend to benefit from Finnish experience, for example, in heat conservation. Imatra Power's decision to gradually abandon oil in its entirety in some areas, for example, in the heating of housing units is exemplary.

Director Magnien still considers coal to be an interesting source of energy: it can be converted, refined, purified; its use should be considered from a completely new point of view and its "clean" usage possibilities should be thoroughly studied.

Nevertheless, in his opinion the future belongs to electricity. The high level of employment can also be considered as one of the benefits of nuclear electricity: In France the power plants employ 150,000 people above and beyond EDF's own personnel.

[Question] Does France have good market prospects at this time?

[Answer] Negotiations are being conducted with Mexico and Egypt, among other countries. I myself believe that in 20-30 years nuclear power plants will be sold just as easily as automobiles are being sold today.

10576
CSO: 5100/2173

NO FUNDS SEEN FOR HIGH TEMPERATURE REACTOR

Frankfurt/Main FRANKFURTER RUNDSCHAU in German 27 May 82 p5

/Article by "gs": "No Chance for High Temperature Reactor, Buelow Says"/

/Text/ Bonn—Federal research minister Andreas von Buelow (SPD) told the cabinet on Wednesday that construction on the high temperature reactor (HTR) at Schmehausen in North Rhine-Westphalia would be halted by the end of June unless new funds were found until then. "We are unable to build" both reactor types—the HTR and the fast breeder—at the same time, von Buelow said, adding that he could not call a "halt to research policy" for the next 5 years just to be able to pay for the two reactors. In justifying his preliminary decision against the HTR and in favor of the fast breeder, the research minister said that research policy decisions must also take the needs of the business sector into account.

The North Rhine-Westphalian economics minister Jochimsen (SPD) who is contributing to the HTR funding sees it much the same way. "North Rhine-Westphalia is not in a position to finance a state reactor against the opposition of the rest of the world—a reactor nobody wants," Jochimsen told the research committee in Bonn on Wednesday. North Rhine Westphalia did not come out in favor of the HTR simply because it is good for refining coal, he said. In contrast to other reactors, the HTR offers "surplus security."

In all likelihood, the research minister will have to recommend to the cabinet in 4 to 5 weeks that construction be halted, since he sees no hope of closing the DM 1.5 billion gap with the help of regular budget funds, money from the business sector, a research tax or a "nuclear penny" to be added to home electric bills. In view of the "unresolved cost picture," von Buelow told the cabinet, he did not release the DM 298 million instalment due in early April to enable the HTR construction program to continue. On 22 March, he said, the HTR consortium had informed him that there was likely to be a DM 1.1 billion overrun on the reactor budgeted for DM 3 billion. This sum includes DM 400 million in the form of a risk surcharge based on the "indeterminate outcome of the ongoing approval procedures."

He had thereupon been told by the finance minister, von Buelow said, that no guaranteed government loans to fund the HTR could be approved because of the open-ended nature of the total costs. As a consequence, von Buelow said, there is a DM 1.5 billion shortfall in funding the project.

According to the research minister, DM 1.7 billion have already been paid out and another DM 2 billion have been committed for the HTR project. Calling a halt to construction was not likely to cost more than the DM 2 billion already approved. The federal government is to contribute 57 percent of the DM 3 billion total costs for the HTR, with North Rhine-Westphalia contributing 10 percent; the operators of the facility, 3 percent and the producers, 4 percent. Investment allowances are to make up 9 percent and loans 17 percent of the total.

Von Buelow and Jochimsen had a meeting last Monday with representatives of Ruhrkohle AG, Ruhrgas AG, the electrical industry and the chemical industry concerns of Bayer, Hoechst, BASF and the Huels chemical works concerning the utilization and funding of the HTR. Von Buelow said he could detect "sympathy" on the part of the business representatives for the HTR but no new financial commitment. For the coal and gas industry, von Buelow said, the HTR which not only is capable of producing electricity but heat may be of help "in the long run"--perhaps in "15 or 20 years"--in the gasification of coal. The power industry, for its part, thought that the HTR was of no real use at this time in the production of electricity alongside the light-water reactor. The electrical industry is in fact pinning its hopes on the fast breeder, von Buelow said.

Meantime, the research minister also expects "rather sizable cost overruns" for the breeder. The total cost estimate of DM 5 billion for the breeder was arrived at, he said, by assuming "very favorable" delivery and approval schedules. Negotiations with producers and operators on covering cost overruns are already underway. The operators themselves are by now talking in terms of total costs in the DM 5.5 billion to DM 6 billion range.

In response to a query by FRANKFURTER RUNDSCHAU, Ulrich Steger, the energy expert of the SPD fraction, said the von Buelow decision against the HTR and in favor of the breeder would not be approved by a majority of the SPD and FDP Bundestag fractions. The wishes of the electric industry should not, so Steger said, "determine the course of research policy."

9478
CSO: 5100/2188

SODIUM FIRES CAUSE INDEFINITE PHENIX SHUTDOWN

Paris LE MONDE in French 4 May 82 p 48

> /Text/ The prototype Phenix nuclear power station, on the grounds of the Marcoule nuclear studies center (Gard), has been shut down since Thursday 29 April for a still undetermined period. Two incidents 24 hours apart, though "without radiological consequences to the environment," have affected operation of the 250 megawatt power breeder reactor station, and led the operators to put the plant in "security configuration."

The first incident occurred Thursday evening. Like the second, it took place in one of the station's three steam generators, in which circulates hot sodium totally inactive radiologically. There that sodium, called secondary to distinguish it from the primary sodium whose function is to evacuate the calories produced in the reactor core, heats water to produce the steam needed to activate the turbo-alternator which produces the electricity for the net. Though sodium is particularly well suited to the needs of this type of reactor, of which the 1200-megawatt Super-Phenix station under construction is the industrial prototype, it has the disadvantage of reacting violently with air and water.

That is exactly what happened with Phenix. When checks were made of the sodium content of the secondary circuit, the station's operators noted an abnormal hydrogen count--a characteristic of chemical reaction between sodium and water. The reactor was immediately stopped, and the steam generator in which there was a leak was drained and put in a security configuration.

Twenty four hours later, for reasons still unknown to the investigators, a valve in the same steam generator in turn began to leak, freeing a few liters of sodium which immediately caught fire on contact with air. The fire was quickly brought under control by a powdered extinguisher (Mercalina) perfected by teams from the AEC and CNRS Orleans center for study of combustion and high temperature chemistry (LE MONDE, 14 April).

Although rare, this type of incident is not unusual, and there have been a few past alerts of this kind at the Phenix station, which was put in operation in 1973 as a test unit for the chain of breeder reactors. In 1974, for example, there were sodium leaks, and in 1976 a sodium fire in the intermediate heat exchangers of the reactor. That problem led, however, to modification of the assembly.

Thus Thursday's and Friday's events, in their safety aspects, are not such as to cause undue alarm to the AEC teams, who point out, moreover, that the faulty steam generator had functioned without problems for almost 10 years.

6145
CSO: 5100/2165

ANTI-NUCLEAR MARCHERS DEMAND SUPER-PHENIX SHUTDOWN

Paris LE MONDE in French 4 May 82 p 48

/Article by Marc Ambroise-Rendu: "For a Life Without Plutonium"/

/Text/ Wearing jeans and basketball shoes, with placards on their chests and streamers in hand, the anti-nuclear marchers who left Malville 3 weeks ago entered the capital on Saturday 17 April. A wager made good.

They have hardly changed since that July day in 1977 when through rain and clouds of tear gas they tried to pierce the lines of security police defending the breeder reactor building site. They are 5 years older, but they are still the same headstrong idealists dreaming of a plutonium-free society. Super-Phenix will produce its first kilowatt-hours next year. For their part, they march, boys and girls, young and old, a thin cohort of dissident pilgrims, barefoot innocents denying the evident and preaching refusal.

They were 40,000 at Malville in Giscard's time, and today 40,000 of them have set out to meet the head of state. He is in Japan; the militants are demobilized; and French Electricity and the Atomic Energy Commission are shipping cargoes of journalists to Cadarache and Malville to demonstrate that the breeder reactor is the safest and most esthetic of megamachines. No matter--they march as others kneel.

Since the start, the same scenario has recurred a score of times. In the lead, a sound vehicle harangues the villagers; in the rear, the service van picks up the footsore; in between, the squad of marchers advances at 5 km an hour, handing out tracts to bystanders. Each evening at the halt, under the eyes of debonair and often interested gendarmes, a militant tosses into a basin a few grams of sodium, the substance which in quantities of several thousand tons will cool the bowels of the breeder reactor.

It looks like a bit of butter with the color of aluminum, and flares up prettily with a puff of white smoke: that is what awaits you, good people, if the Super-Phenix weld joints have weaknesses. Then, in the village hall, to a few dozen viewers, are shown audiovisuals on the breeder reactor and on alternative proposals by opponents of nuclear power. There are discussions, explanations, and challenges to local Socialist office holders, who often admit their embarrassment.

But what in the world are these tireless people asking? "First, an immediate halt to the building of Super-Phenix--in short, a moratorium," they explain. "Plutonium remains active for tens of thousands of years. We can surely give a few months to serious thought about it. We must take the time to organize the true democratic debate which has been denied us. Then the French people will be able to choose between our energy proposals and the nuclear program the government stubbornly pursues. With the breeder reactor, nuclear energy is not the transitional energy we hear about; it is a long-term choice which practically excludes all others."

"Anesthesized"

How has that speech been received along the way? "People receive us and listen with sympathy," the marchers note. "They know hardly more than 5 years ago, even the office holders. But they seem to be anesthesized. Nuclear power today is routinized. It is considered inevitable. We are here to awaken opinion and undeceive it. The problems we have been bringing up for years are still present. They will rise again with the first accident."

The marchers everywhere slept in local homes. They were received and assisted by many municipalities. To pilgrims the law of hospitality still applies. But did they convince? In any event, they collected thousands of signatures on postcards, addressed to the president, asking him to stop Super-Phenix. He will receive over 100,000 of them. But will he receive the marchers themselves? They will appear before the Elysee for the first time on Sunday (did they know the president was away?). If the gates are not opened, a delegation will present itself each month for as long as necessary. "As long as the nuclear program continues," they say, "the anti-nuclear struggle will continue."

6145
CSO: 5100/2165

DEFECTIVE STEEL IN BOLTS HALTS FORSMARK NUCLEAR REACTOR

Seven Hundred Bolts Involved

Stockholm SVENSKA DAGBLADET in Swedish 2 Jun 82 p 6

[Article by Dag Bjerke: "Cracked Bolts Stop Reactor"]

> [Text] Two hundred forty of a total of 700 bolts in the fuel core of the second reactor at Forsmark are cracked. All the bolts must be replaced, which means that the present work stoppage will be extended by almost 2 months.

The same problem is probably going to arise when Forsmark I is shut down for routine inspection in a few months. That reactor has the same type of unfortunate bolts as the nuclear power station built by Asea-Atom in Raumo, Finland, on the other side of the Bothnian Sea.

When the technicians of Asea-Atom constructed these reactors in the 1970's, overambitious computer calculations predicted strong vibrations during start and stop. To protect against these difficulties it was considered necessary to use best quality bolts to secure the control rods on the inside of the core grating cavity.

Tightened Hard

Therefore bolts of extra-strength stainless steel were chosen, which are surely completely adequate under normal circumstances. But under strong tension, for example if the bolts are tightened too hard, in combination with the presence of hot water, the material apparently becomes affected with something called tension corrosion.

The exact nature of this kind of corrosion is not entirely known, but it is known that the condition must have tension and moisture at the same time. If only one of these components is present, the steel remains corrosion-free and strong.

In older reactors, where such sophisticated material has not been used, corresponding problems have not arisen.

Heads Stuck Out

The defective bolts were discovered on 19 May when a fuel element was being lifted out of the core. The element was caught on a bolt head, which was normally countersunk, which stuck out from the control rod and thereby prevented a lip on the fuel element from passing upward.

The bolt in question had therefore broken. It was removed from its radioactive environment by using a remote manipulator. The entire core lay under 20 meters of radiation shielding water.

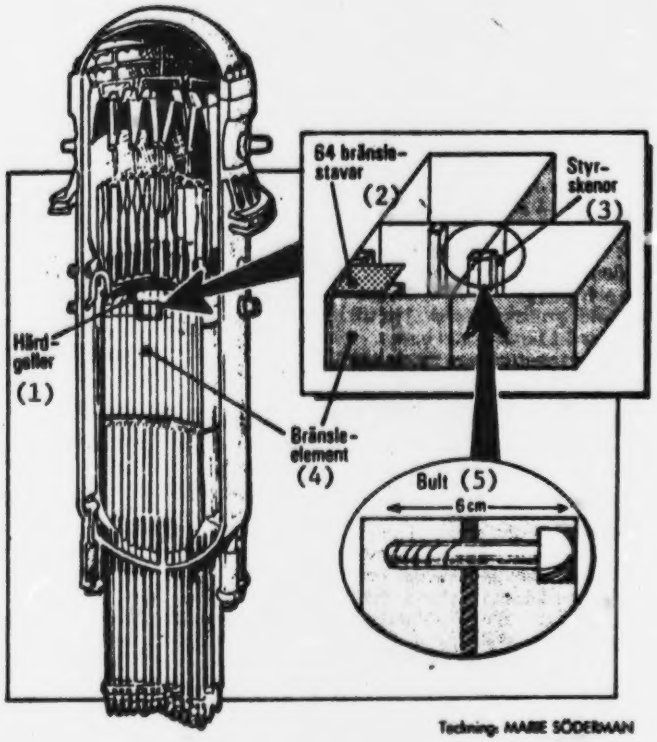
During the work which takes place in connection with annual maintenance, the cover of the reactor tank and all interior details above the core grating are lifted away.

About 250,000 Kronor Per Day

For about the next 2 months, which in terms of lost energy deliveries amounts to 200,000 - 300,000 kronor per day, it will now be necessary to lift up the entire radioactive grating and with manipulators install 700 new bolts of a more suitable material.

It is difficult to see any direct safety risk in this circumstance. The problem is more nearly one of operational technique. It is difficult (or impossible) to take out old expended fuel elements and replace them with new when refuelling the reactor.

[Diagram and caption on following page.]



Teckning: MARIE SÖDERMAN

Key: (1) Core grating
(2) 64 fuel rods
(3) Control rods
(4) Fuel element
(5) Bolt

Caption: The defective bolts of high-strength stainless steel hold the control rods in the four corners of the core grating square. These rods in turn hold the four fuel elements (each containing 64 uranium fuel rods) in each corner of the square space.

The control rods ensure that a cruciform interval is maintained between the elements, which the control rods, regulating reactor power, can be inserted into or withdrawn from. The bolt heads are countersunk in the control rods so that the lip on the fuel element (not shown in the diagram), passing out by the control rod will not be stopped when removing the old fuel element and inserting the new.

New Steel Material Being Studied

Stockholm DAGENS NYHETER in Swedish 5 Jun 82 p 31

[Article by Ingemar Lofgren: "The Steel Did Not Measure Up And Therefore The Bolts Cracked"]

> [Text] Asea-Atom is searching for a new steel for the bolts and spring beams which cracked in the four reactors at Forsmark and Finnish Olkilouto. The high-strength steel did not measure up. "We are now going back to an older type of material," said Per Faxer, financial manager of Asea-Atom.

"Our technicians are very busy finding a suitable material for new bolts and beams. We do not know how long it will take, but we must do careful testing and calculate the possible costs," said Per Faxer to DAGENS NYHETER.

A couple of weeks ago it was discovered that reactor bolts in Forsmark 1 and 2 and Olkilouto 1 and 2 in Finland had cracked from so-called tension corrosion. They had been tightened too hard.

Cracked Beams

The purpose of the bolts is to hold the fuel rods in place in the reactor, and there are 700 bolts in each reactor.

When the faulty bolts were investigated it was discovered that the spring beams were also cracked. The 1.5 meter long beams are located under the reactor cover, and their purpose is to hold the moisture trap and separators in position. In each reactor there are eight tightly fastened spring beams.

The four reactors in Forsmark and Olkilouto are the same model and built by Asea-Atom. Altogether it is a question of 2,800 bolts and 32 spring beams which must be replaced--all made of high quality stainless steel type 2570. The steel was chosen especially before the construction of Forsmark when Asea-Atom was bringing in a new reactor construction.

The firm believed that there was great risk of strong vibrations, and therefore chose a high-strength material for the bolts and beams.

Everything was fine until the cracks were discovered.

"We have not been so knowledgeable about tension corrosion, but now we have learned a little more. We now know that there is not so much vibration and that neither the bolts nor the beams need to be so tightly fastened. We will therefore go back to the original and proved material which we used previously," said Faxer.

The cracks in the spring beams are, in comparison with the defective bolts, relatively undramatic, according to both the firm and the nuclear power inspectors. They are easier to replace and will not affect the difficult work with the bolts.

In Sweden Forsmark 2 has already been stopped for inspection. Forsmark 1 will be stopped in the middle of July.

All the bolts and beams are expected to be replaced by the beginning of August.

9287
CSO: 5100/2186

LOSS OF HOPED-FOR MEXICO ORDER MAY BE FATAL TO NUCLEAR FIRM

Stockholm SVENSKA DAGBLADET in Swedish 16 May 82 p 14

[Article by Karin Henriksson]

[Text] Is little Asea Atom strong enough to win the Mexican order for nuclear power plants?

The lobbying is over and the bids are in and the seven competing nuclear firms can only wait.

The order is important for Asea Atom, which has no further prospects on the Swedish market. As SVENSKA DAGBLADET reported yesterday, it looks like Asea Atom will be a wholly owned subsidiary of Asea, since the state is prepared to sell its half. One reason for this transaction is that Asea wants to retain the skilled personnel within the company, even though the nuclear power market is slumping--but this does not mean that Asea Atom has given up hope in Mexico.

A decision on who will receive the coveted order worth up to 150 billion kronor will not be made until early fall after a new president takes over.

Reports that Mexico, which is experiencing economic difficulties since oil revenues began to decline, would be forced to cut back on its extensive plans for nuclear power have been denied vigorously. The recent decision by the Mexican government to reduce public expenditures by 3 percent annually will not affect these plans, according to a spokesman at the Mexican Embassy in Sweden. "This will be guaranteed by expansion in the oil and mining sectors," he said.

"According to our information, the project will proceed as planned. We may assume that price and financing will become all the more important in their decision, however," said Arto Kaipainen, information director at Asea Atom.

Secret

The secrecy around this politically charged transaction has been extensive, both on the part of the Mexican authorities and the seven nuclear firms that submitted bids in sealed envelopes on 1 February this year. Asea Atom's technical information alone required 24 standard size folders. Also submitted was the envelope in which Asea Atom, with the government's blessing, revealed the price which is based on unknown hundreds of millions in export credit.

Mexico is suffering from an electricity shortage today, but according to plans at the end of this century nuclear power plants will generate 20,000 MW annually. That is equal to one fifth of the present nuclear capacity in the world.

The value of the entire order is estimated at 140 to 150 billion kronor. In addition to 20 reactors, it includes fuel production, waste handling, administrative advice, etc. The construction site is on the Atlantic coast in Laguna Verde near the port city Veracruz. There is already a 1,300 MW nuclear power plant there which General Electric has been building off and on since 1973.

Technological Prestige

The country that lands the Mexican order will save tens of thousands of jobs and uphold its technological prestige.

There has been a steady stream of suitors to President Jose Lopez Portillo in Mexico City. French President Mitterrand visited Mexico City on his first visit abroad as president in October and 2 months later a special envoy arrived from President Reagan of the United States. The most frequent visitor has been Prime Minister Pierre Trudeau of Canada and the Canadian Candu reactor was seen as the favorite in the first round of bidding.

After Trudeau's most recent visit, his portrait had hardly been removed from the parade route when King Carl Gustaf arrived with an elite delegation from Swedish industry.

The second favorite is France and this is not so much because the French nuclear industry is superior to the others as it is because the French tend to ignore the rules of international financing.

After all, Mexico must be given favorable financial arrangements if the purchase is to take place at all.

Normally it is against American principles to extend this type of credit, but when Reagan's envoy visited Mexico it became clear that the American government was willing to negotiate special conditions in this case. One factor making a deal with the Americans less likely is that Mexico already is about 70 percent dependent on trade with its powerful neighbor to the north. Mexico wants to reduce this dependence and on various visits Canada, France, and Sweden have stressed their willingness to strengthen friendly relations with the Mexicans.

Phase 1, included in the first round of bidding, is worth at least 10 billion kronor, of which half shall be spent in the nuclear power company's own country. Seven firms in five countries are involved in the battle: the United States (General Electric, Westinghouse, Combustion Engineering), Canada (Atomic Energy of Canada), West Germany (KWU), France (Framatome), and Sweden (Asea Atom).

Asea Atom is a dwarf in these circles, but enjoys an extremely good reputation with its Swedish purchaser--i.e. the State Power Board.

"Asea Atom's knowledge and experience are beyond question. Of course, it is difficult to make simple comparisons of nuclear firms, but Asea Atom has both sound technology and good fuel," said a spokesman at the State Power Board.

Asea Atom (which at the moment is owned half by Asea and half by the state) has built nine reactors and two others are under construction. Two of the reactors, TVO 1 and TVO 2, are in Finland. Asea Atom's reactors are boiling water reactors. Forsmark 3, which is the reference facility in the Mexican bid, will be complete in 1985.

General Electric (boiling water reactors) has manufactured most of the reactors used in the United States. GE also has exported reactors to Spain, Italy, and Mexico and worked together with AEG of West Germany. GE reactors are manufactured under license in Japan.

Largest Company

Westinghouse, which is the largest nuclear power company in the world, had 109 reactors operating in 1979, in addition to 53 manufactured under license. Westinghouse fuel and equipment has been sold to nine countries and the company hopes to triple the number of Westinghouse plants during the next 10 years. Westinghouse pressurized water reactors have experienced problems recently, however. Ringhals 3 has been restarted at half-power after being down since October last year and, for this reason, many are awaiting the outcome of the legal battle that may be expected between Westinghouse and the State Power Board.

Combustion Engineering (pressurized water reactors) had constructed 10 reactors by 1981 and eight units are under construction for completion in 1983 to 1985. All are in the United States.

Atomic Energy of Canada, AECL, constructed its first reactor in 1962 and by 1985 to 1986 it will have completed 15 reactors of 16,700 MW. The AECL heavy water reactor is found mainly in Canada, but also in Argentina, South Korea, Pakistan, and India. Uranium for the heavy water reactor need not be shipped to the United States or France for enrichment, as is the case with competitive fuel types, but even though Mexico has large uranium reserves, it would be dependent on Canada to deliver heavy water.

Broad Program

By 1981 KWU, Kraftwerk Union (pressurized water reactors), had constructed 30 reactors--one each in Switzerland, the Netherlands, and Austria, two each in Spain, Argentina, and Brazil. The rest are located in West Germany. KWU has a broad energy program including natural gas, coal, and petroleum technology, in addition to nuclear expertise.

Framatome (pressurized water reactors under license from Westinghouse, in addition to independently developed reactors) has 51 reactors complete or under construction. Most are in France, but seven were sold for export to South Africa (2), South Korea (2), and Belgium (3).

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END

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15 July 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 152

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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15 July 1982

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 152

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FUEL FROM SOVIET-BUILT FINNISH NUCLEAR PLANT SENT TO SWEDEN

Helsinki HELSINGIN SANOMAT in Finnish 5 Jun 82 p 10

[Article: "Fuel From Loviisa Nuclear Power Plant to Sweden"]

[Text] Loviisa--At this time a most unusual load of cargo in a long time is sailing from Finland to Sweden. A bundle of nuclear fuel that has been in the Loviisa 1 reactor for 3 years left the Port of Loviisa on Friday evening in the ro-ro ship Bore Song.

The bundle was removed from the reactor in 1980 and now it is being sent for study at the Studsvik Research Institute in Central Sweden.

The bundle weighs only 120 kilos, but due to the forceful radiation of the fuel, it is packaged in a transport container weighing approximately 30 tons. Therefore, a traction vehicle leased from Sweden for ground transportation and a ship intended for specialized transport are needed.

One of the reactor's 349 fuel bundles is being sent to Sweden because the Finns need additional information on nuclear fuel.

An agreement was reached with respect to a study on the fuel bundle between the Ministry of Trade and Industry and the State committee supervising the use of Soviet nuclear fuel. Imatra Power has also concluded a cooperative agreement with the Swedish Studsvik Energiteknik Corporation.

Studies Will Take 6 Months

"The fuel in Sweden will last 6 months," states Licentiate in Engineering Antero Tamminen of Imatra Power.

"The fuel bundle will be disassembled into parts. It consists of 126 fuel rods, whose surface will be studied with exceptional precise measurements. Samples will also be scraped from the surface for laboratory studies."

After the studies are completed the bundle will be returned to Loviisa from where it will in time be transferred to the Soviet Union just as all the other spent fuel.

Officials of the Radiation Safety Institute in Finland have kept an exceptionally close surveillance on the fuel in the Loviisa Nuclear Power Plant during the operations of the plant since Finnish officials did not have an opportunity to familiarize themselves with the manufacture of the fuel at the Soviet plant.

Only One Leak in Protective Skin of the Rods

The Radiation Safety Institute has also determined an 8-percent power limitation during the initial stage of the operations of the plant at Loviisa.

However, the fuel at Loviisa has so far turned out to be secure. For example, there has been only one leak in the protective skin of the fuel rods. Internationally, this is considered to be an exceptionally good situation.

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CSO: 5100/2185

STUDY ADDRESSES URANIUM MINING DEVELOPMENT ISSUES

Canberra THE AUSTRALIAN in English 27 May 82 p 14

[Article by Nicholas Rothwell]

[Text] THERE is "no long-term possibility" that resource development in the uranium-rich Alligator Rivers province of the Northern Territory can be avoided, one of Australia's top mining company executives has predicted.

Mr John Elliston, a senior geologist for Peko-Wallsend, has prepared a detailed study of Australia's resources, which makes the controversial claim that the Northern Territory's Alligator Rivers uranium deposits, many of which are now in a region zoned as National Park or Aboriginal Land, will be needed for use in the world's nuclear power reactors.

Mr Elliston also warned that industrial development in Australia lay in "a miserable shambles" at the feet of government over-spending and union greed.

"Significant socio-economic factors" were impeding development and stultifying the national livelihood.

"We have lost sight of the goal of national development in keeping with national growth, we have tried to reap the benefits of our natural resources and industry before the work, effort and cost of developing them have been applied to the task," he said.

Movement forward for Australia was impeded by ridiculous policy, legal complexities and over-regulation, excessive tax burdens and imposts, exaggerated environmental claims and rising costs.

The technical task of finding an ore-body to develop had become "almost trivial" compared with the other task facing resource development companies — the task of overcoming the impediments to development.

Many more mineral and petroleum reserves remained for discovery in Australia because they lay concealed beneath the surface, and the harsh inland climates of the continent had resulted in incomplete settlement and exploration.

Australian industry had the technological skills to find and develop the natural resources of the country, which were essential to a resource-hungry, over-populated world.

Already 40 per cent of the nation's export earnings were provided by the mining industry, which was worth more than $7100 million a year.

Mr Elliston stressed prospects for discovery of oil and gas in Australia were good, but that this country would remain "at the mercy of OPEC" until it developed other sources of energy.

He detailed major resource deposits already found but not yet in development:

● McARTHUR River lead-zinc deposit in the Northern Territory — probably the largest such resource in the world, but still delayed because of problems with the economics of the mine:

● JABILUKA uranium ore-body in the Northern Territory, certainly the largest in the world but held up for 10 years "by government intervention" and not yet in production;

● SIGNIFICANT other uranium resources at Roxby Downs, Ranger 68 and Beverley are also held up, mainly pending clarification of policy issues.

He also warned that the "ravenously money-hungry Government" had reduced the oil exploration industry to the worst state in its history, with steep rises in tax levels on oil and gas, while hardly any exploration had been mounted in highly prospective areas such as the Cooper Basin.

But the worst example of bad planning for Australia's future was the uranium industry, where "post-industrial era philosophy" had worked on popular ignorance to cloud the question of nuclear power

"The Alligator Rivers province contains possibly the largest low-cost energy source in the world and in our rapidly overpopulating globe, millions of people are going to be dependent on it," Mr Elliston warned.

"An energy resource of the same order as the presently known oil reserves of Saudi Arabia will not be left inviolate in the ground while the price of industrial power elsewhere in the world climbs beyond the reach of billions of people who live in cities which depend on low-cost power."

Australia could not choose to withhold its uranium from the world without a mounting risk that other more energy-dependent nations would seek to develop the fuel for Australia by one means or another.

CSO: 5100/7536

PROTESTERS OCCUPY HONEYMOON, OTHER URANIUM MINES

Antimining Campaign

Canberra THE AUSTRALIAN in English 17 May 82 p 3

Article by Nicholas Rothwell]

[Text] THE anti-nuclear movement yesterday began a nationwide campaign to block new uranium mining ventures, with hundreds of demonstrators converging on mine sites in South Australia and Queensland.

More than 370 demonstrators are camped on the edge of the Honeymoon mine in the far north-east of South Australia.

At the Ben Lomond mine near Townsville, a demonstration is being mounted by a smaller group, the World Bike Ride for a Nuclear-Free Future — a protest group that plans to cycle round the world calling for a halt to uranium mining, and a ban on nuclear weapons and power stations.

The demonstrations come as the local uranium industry is weathering a crisis of confidence following Exxon's decision last week to pull out of the development of Western Australia's rich Yeelirrie uranium mine.

Last week, at an inspection of the Honeymoon project, the deputy general manager of CSR, Mr Bryan Kelman, warned that mining would not go ahead without public support for the project. CSR is the main partner in the project.

Police were keeping a close watch yesterday on the demonstators at Honeymoon and Ben Lomond, which is operated by the French-controlled Minatome company.

The protesters at Honeymoon plan to take over the mine site, which is little more than a clutch of huts surrounded by expanses of talc-fine red dust and scattered saltbush.

But lawyers representing the co-ordinating protest group, the Coalition for a Nuclear-Free Australia, fear that the Honeymoon protest, which is being mounted on a principle of "non-violent occupation," may be cut short by the police

A spokesman for the South Australian Police said last night the demonstrators were welcome to stay around the site provided no damage was done to the property of the developing company.

"If we ever want to get rid of them, all we have to do is go up wind of where they are and drive a truck up and down, and they will be covered in the dust clouds, if they haven't already been eaten by the ants," the spokesman said.

At Ben Lomond, Townsville police are keeping an eye on the mine site. One policeman said he believed the protesters would be so tired by their bike ride from the coastal plain they would be in no fit state to do any damage.

Clashes with Police

Brisbane THE COURIER-MAIL in English 18 May 82 p 10

[Text] **BROKEN HILL. — About 400 protesters yesterday ended their three-day occupation of South Australia's Honeymoon uranium mine despite violent scenes on the last morning.**

After being refused a meeting with the management three times, about 30 protesters began tearing down a 75 m section of high-security fence surrounding a "no-go" zone.

They had declared the site to be the property of the Aboriginal people and demanded that police and mining officials leave.

Police with dogs were unable to stop the protesters from spilling into the out of bounds area, where they staged a 90 min sit-in.

At one stage, some of the 30 police at the fence struggled with demonstrators but the occupants refused to move.

Some demonstrators received minor cuts and bruises in the clashes but there were no serious injuries.

In a statement to be sent to the Prime Minister, Mr Fraser, and the South Australian Premier, Mr Tonkin, the group protested at the "excessive deployment of police to protect the mining companies' interests by officers, horses, dogs, patrol cars and a spotlight tower on the scale of a military operation."

The statement said: "We declare that this Honeymoon protest is only the start."

CSO: 5100/7535

NUCLEAR CIVIL DEFENSE SAID TO BE NEGLECTED BY GOVERNMENT

Canberra THE AUSTRALIAN in English 19 May 82 p 9

[Article by Fia Cumming]

[Text] AUSTRALIANS would be better protected by a $5 million civil defence program than by an aircraft carrier and jets costing $1000 million, according to many of the nation's foremost independent experts on security.

And, according to civil and defence analysts and leaders who recently met at the Australian National University in Canberra for a conference on Civil Defence and Australia's Security, governments are doing little to make sure that people living in Australia are protected against nuclear or conventional attack.

Civil defence in Australia is left to the under-budgeted National Disasters Organisation and State governments' emergency services. While nuclear scares have companies specialising in building nuclear fallout shelters reportedly doing record business a private shelter, which can cost up to $17,000, is out of the question for the general public.

The chairman of the strategic studies unit at the West Australian Institute of Technology, Dr Geoffrey Williams, said at the conference he believed increasing tensions between East and West had raised questions about the readiness of Australia to look after its civilian population in the event of a nuclear or non-nuclear attack.

"It is time that the federal Government came up with a comprehensive policy guide on how it might be possible to survive a wide variety of attacks on the civil population," Dr Williams said. "There is a head-in-the-sand attitude towards the whole question of civil defence which is truly disturbing.

"Well, it is time to contemplate the unthinkable — even though I do not regard a Soviet nuclear first-strike on Australia as a particularly likely contingency."

Another claim made at the conference was that a nuclear attack would not necessarily be the end of the world, or even the end of the world as we know it. With adequate protection only 2 to 3 per cent of the population would be casualties, even in an all-out nuclear exchange, it was claimed.

But relative to other countries, Australia is certainly not well prepared.

Professor Richard Aynsley of the University of Technology in Papua New Guinea compared some countries' programs:

UNITED STATES: Between 1970 and 1979 it spent about $900 million on civil defence, most fallout shelters in ordinary buildings above ground level.

RUSSIA: Between 1970 and 1979 it spent about $365,000 million. Much shelter space underground.

SWITZERLAND: Has had a fallout shelter building program for the past 20 years and can shelter 70 per cent of the population.

AUSTRIA and GERMANY: Similar programs to the Swiss, but less advanced.

FINLAND, NORWAY and SWEDEN: All have large underground public shelters and hospitals and aim to provide shelter space for the entire populations.

ISRAEL: A widespread shelter network which was used effectively during the Six-Day War.

CHINA: Shelter space for most of the population in simple underground spaces.

In comparison, the conference concluded, Australia's civil defence programs were under-funded and under-planned. In the words of the director-general of the NDO, Major General K.W. Latchford, the NDO's "one distinct civil defence capability" is its fallout shelter-space survey.

The survey was set up in 1966 to examine large buildings in all capital cities as potential fallout shelters in the event of a nuclear attack.

Originally there were survey offices in all States and a team of 14 surveyors. There is now one office, in Sydney, and a staff of two. The most senior surveyor recently left and has not been replaced.

The results of the survey are no more comforting. So far the survey has examined the following numbers of buildings as possible shelters (some of these may have been found unsuitable):

ADELAIDE: City 270, suburbs 0

HOBART: City 0, suburbs 0
PERTH: City 140, suburbs 100
BRISBANE: City 100, suburbs 350
MELBOURNE: City about 200, suburbs 75
SYDNEY: City about 200, suburbs 120.

The people responsible for our civil defence are also concerned.

The scientific advisor to the NSW and Tasmanian Emergency Services, Dr D.W. Posener, said even one medium-yield nuclear warhead exploding on Australian soil would cause chaos in present circumstances, no matter where it landed.

Both immediate and delayed effects must be considered, and a civil defence program tailored to Australia's unique geographic situation.

"The current 'public safety' provisions are minimal," Dr Posener said. "Contingency planning could make a very significant improvement at very low cost — given sufficient (say two years) lead time."

Even the Defence Department, while accepting the emphasis on civil defence against natural disasters, criticised present civil defence arrangements and found "it would be wrong to conclude that all is necessarily well".

Areas for concern were:

- Variation between States would hamper efforts in any national disaster.
- Potential disaster problems were being underestimated, especially in relation to cities.
- Emergency services were clustered where they would inevitably be damaged in any urban disaster.
- Voluntary and professional services were being distracted by "boundary disputes" in their work.
- There was evidence that some plans existed only on paper because of dire shortages of manpower, systems and resources to carry them out.

The greatest irony to emerge from the conference was that a civil-defence program, which would prepare the nation for an emergency and have a huge life-saving potential, would cost (according to three different speakers) only $5 million a year over two or three years.

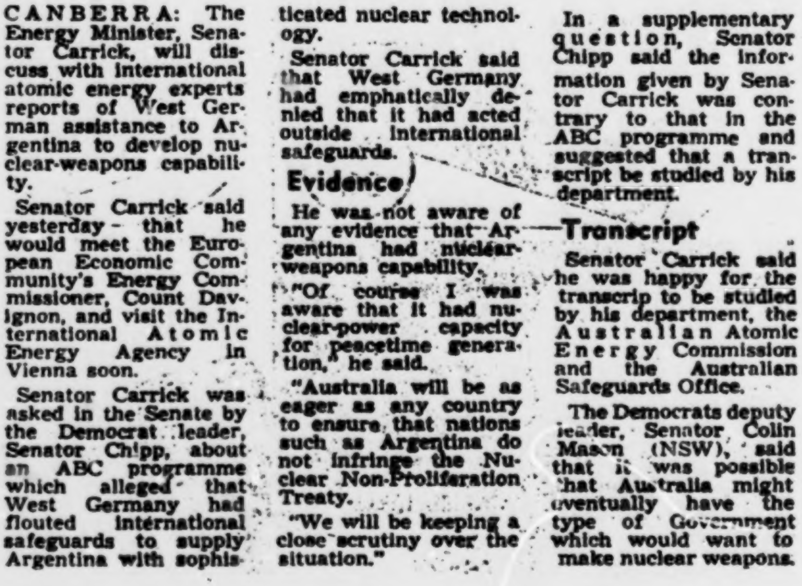
That is roughly the same as the NDO's present budget, and 0.13 per cent of the original defence budget for 1981-82.

In other terms, it is one 200th the cost of the Invincible and the Harrier jump-jets needed to make it effective.

CSO: 5100/7535

SENATOR TO CHECK RUMORED BONN NUCLEAR AID TO ARGENTINA

Perth THE WEST AUSTRALIAN in English 19 May 82 p 50



[Text] CANBERRA: The Energy Minister, Senator Carrick, will discuss with international atomic energy experts reports of West German assistance to Argentina to develop nuclear-weapons capability.

Senator Carrick said yesterday that he would meet the European Economic Community's Energy Commissioner, Count Davignon, and visit the International Atomic Energy Agency in Vienna soon.

Senator Carrick was asked in the Senate by the Democrat leader, Senator Chipp, about an ABC programme which alleged that West Germany had flouted international safeguards to supply Argentina with sophisticated nuclear technology.

Senator Carrick said that West Germany had emphatically denied that it had acted outside international safeguards.

Evidence

He was not aware of any evidence that Argentina had nuclear-weapons capability.

"Of course I was aware that it had nuclear-power capacity for peacetime generation," he said.

"Australia will be as eager as any country to ensure that nations such as Argentina do not infringe the Nuclear Non-Proliferation Treaty.

"We will be keeping a close scrutiny over the situation."

In a supplementary question, Senator Chipp said the information given by Senator Carrick was contrary to that in the ABC programme and suggested that a transcript be studied by his department.

Transcript

Senator Carrick said he was happy for the transcrip to be studied by his department, the Australian Atomic Energy Commission and the Australian Safeguards Office.

The Democrats deputy leader, Senator Colin Mason (NSW), said that it was possible that Australia might eventually have the type of Government which would want to make nuclear weapons.

CSO: 5100/7535

JABILUKA URANIUM PROJECT PAYMENTS TO ABORIGINALS NOTED

Canberra THE AUSTRALIAN in English 21 May 82 p 15

[Article by Bruce Jacques]

[Text] **PARTNERS in the Jabiluka uranium project will pay as much as $10 million to the Northern Territory's Aborigines before any yellowcake is produced in probably the most comprehensive and generous royalty agreement in Australia's history.**

A copy of the draft agreement between the partners and the Northern Land Council shows the project's payments to Aborigines would be much bigger than those of the nearby Ranger and Nabarlek uranium mines.

The draft agreement has been circulating among the Territory's Aborigines since March when it was initialled by the NLC.

It is still confidential and yet to be fully approved by the NLC which is seeking comment from traditional land owners in the Jabiluka area.

The agreement will also need approval from the Federal Minister for Aboriginal Affairs, Mr Wilson.

Under the main points of the "up-front" section of the draft agreement, the Jabiluka partners will pay the NLC:

- $1 MILLION after ministerial approval of the project and a further $800,000 over the next four years.
- $1.2 MILLION for each of the five years after agreement is reached for the sale of at least 3000 tonnes of yellowcake.
- $1.2 MILLION a year for three years starting 12 months after approval of the mining agreement.
- $3.4 MILLION when production starts.

The NLC will get 4.5 per cent of Jabiluka's revenue plus $500,000 a year for the first 10 years, rising to 5 per cent from the 10-year mark.

The NLC will also get a minimum of $750,000 a year if the operation is suspended.

The agreement provides for monthly environmental reports and obliges the partners to eventually rehabilitate the land to its original state.

Finalising of the royalties is one of only two hitches holding up the Jabiluka partners from starting development following Federal Government approval for the project in March.

The significance of the government approval was that it allowed the Jabiluka partners, Pancontinental and Getty of the United States, to formally tie up contracts for sale of the uranium and to negotiate for loans for the $600 million project.

The other issue which must be resolved before Jabiluka can proceed is that of foreign equity. Pancon has a 65 per cent share in the project and Getty, 35 per cent.

Under Foreign Investment Review Board policy, uranium projects must have at least 75 per cent Australian equity, thus Getty will have to sell at least 10 per cent of its stake.

Pancontinental is believed to have right of first refusal over that stake, but chairman, Mr Tony Grey, has not yet indicated whether the company wants the extra stake.

Except for money paid to the Aboriginal Benefit Trust, the NLC is responsible for distributing the funds paid under the draft agreement.

A list of approved projects is laid down as a guideline for the three Aboriginal organisations which will benefit.

These include items — usually considered basic community services — funded by the Government, such as community amenities, utilities like water, sewerage, power and communications.

Aborigines will also benefit from a unique employment scheme agreed by Pancon.

As well as aiming at 250 local employees by the planned end of the project, a wide ranging education program will be established.

Jabiluka will be coming into production at a time of depressed conditions in the world uranium market, but Mr Grey remains confident the project will be able to tie up contracts, although at prices lower than earlier expected.

CSO: 5100/7535

URANIUM PROJECT PROCEEDING USING IN SITU LEACHING METHOD

Brisbane THE COURIER-MAIL in English 25 May 82 p 19

[Article by Noel Bushnell]

[Text] **CSR Ltd will press on with the Honeymoon uranium project undeterred by the band of protesters the construction site attracted last week.**

A pilot plant being built to test the in situ leaching extraction method is half-finished. It is scheduled to get going in October.

CSR has a 25.5 percent interest through subsidiary AAR Ltd, which is managing the project. MIM has 49 percent and TETON, of the United States, 25.5 percent.

Apart from the basic question of whether uranium should be mined and used at all, the objections to Honeymoon have been largely about the environmental impact of the mining method.

CSR has recently published a pamphlet describing in detail the project and the mining method, although, naturally enough, it is nowhere near as detailed as the environmental impact statement approved by the South Australian and Federal Governments.

In situ leaching is new to this country and the lessees of other small, low grade uranium deposits will be looking anxiously to see how it works out — both economically and environmentally.

The method involves pumping acidified water down a network of cased holes. The water dissolves the uranium and is pumped back to the surface where the uranium is extracted. The water is recycled back through the mine.

$$$$

CSR, of course, is adamant the method is safe and points out that mines in the United States using the method are not only close to population centres but are associated with underground drinking water.

Neither condition pertains to Honeymoon, which is in a barely populated area 75 km, as the executive jet flies, north-west of Broken Hill.

Broken Hill gets its water by pipeline from the Darling River, some distance to the east, and CSR says local underground water is too salty for use by man or beast, except in extreme drought. Further, that water has been naturally contaminated with radon gas and radium for as many million years as it has been in contact with the uranium ore.

The uranium is in the bottom one of the three aquifers — or layers of water-carrying sands — and just in case there is some danger the mining water will be circulated in sealed pipes so there is no contact between it and the unmined layers. CSR says leakages are unlikely but nevertheless a monitoring system will make sure they do not occur.

The most alarming question associated with the project is what impact it might have on the Great Artesian Basin, which supplies water to a vast area of Queensland, Northern Territory, South Australia and New South Wales. CSR is definite: none.

The Honeymoon and Great Artesian Basin water systems are unconnected. It is not possible for the Honeymoon project to contaminate the Basin. CSR says the naturally contaminated groundwater at Honeymoon has been flowing — albeit ever so slowly — towards the Basin for millions of years without any evidence of contamination showing up.

$$$$

It seems, therefore, that economics are likely to prove more of a threat to the project than environmental dangers. The world uranium market has come down considerably since the heady days of 1974, when OPEC decided we should all pay more, a lot more, for our oil.

Here the environmental, antinuclear lobby has been more successful, aided immeasurably by the Three Mile Island scare. Jittery politicians, particularly in the United States, have followed the lead of a jittery electorate in having nuclear power projects put off or cancelled.

The fast-breeder reactor, which recycles nuclear fuel, has also lessened the demand for uranium.

Spot yellowcake (uranium oxide) prices are currently about US$20 a lb — the market is determinedly non-metric — about half that on offer five or six years ago.

However, most yellowcake is sold on long term contracts and those prices have held up much better. The US Department of Energy quotes an average price of US$37.70 a lb at the start of this year and Euratom, the EEC's nuclear co-operative, says the 1981 average was US$33.25, down from US$36 the year before.

A full scale commercial plant at Honeymoon would produce about 450 tonnes (2200 lb) of yellowcake a year for seven to 10 years, therefore creating total revenue — at the highest current price for the maximum mine life — of about US$366 million (A$349 million at current exchange rates).

CSR has not disclosed the estimated cost of building the commercial plant, which is at least two years down the track. But the pilot plant is costing $6 million to build for a leaching solution flow of 6 litres a second, or $1 million a unit of flow rate.

$$$$

A small-scale commercial plant to handle 25 litres a second is planned to be built after the pilot has run for 12 months. The full plant is not scheduled for a further 12 months.

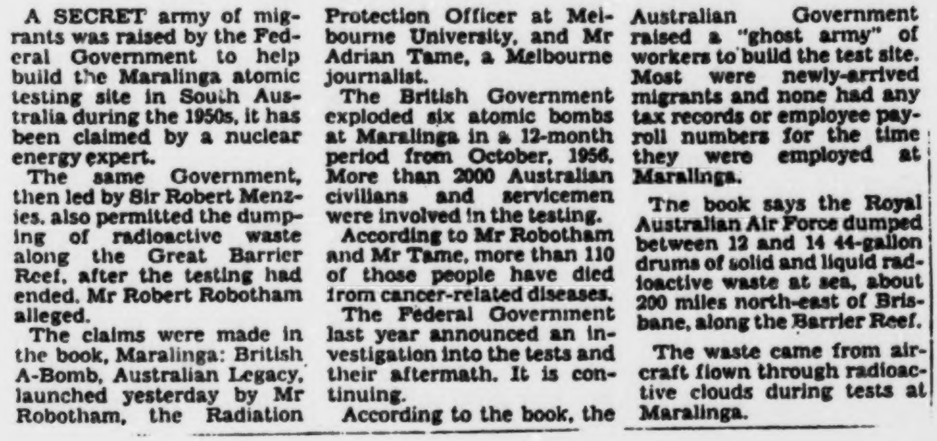
CSR says the advantages of in situ leaching are that it is cheap enough to allow the mining of small, low grade deposits and waste and environmental disturbance are kept to a minimum.

The pilot plant will tell the tale.

CSO: 5100/7535

BOOK CHARGES MIGRANTS USED AT ATOMIC TEST SITE, WASTE DUMPED

Canberra THE AUSTRALIAN in English 26 May 82 p 13



[Text] A SECRET army of migrants was raised by the Federal Government to help build the Maralinga atomic testing site in South Australia during the 1950s, it has been claimed by a nuclear energy expert.

The same Government, then led by Sir Robert Menzies, also permitted the dumping of radioactive waste along the Great Barrier Reef, after the testing had ended, Mr Robert Robotham alleged.

The claims were made in the book, Maralinga: British A-Bomb, Australian Legacy, launched yesterday by Mr Robotham, the Radiation Protection Officer at Melbourne University, and Mr Adrian Tame, a Melbourne journalist.

The British Government exploded six atomic bombs at Maralinga in a 12-month period from October, 1956. More than 2000 Australian civilians and servicemen were involved in the testing.

According to Mr Robotham and Mr Tame, more than 110 of those people have died from cancer-related diseases.

The Federal Government last year announced an investigation into the tests and their aftermath. It is continuing.

According to the book, the Australian Government raised a "ghost army" of workers to build the test site. Most were newly-arrived migrants and none had any tax records or employee payroll numbers for the time they were employed at Maralinga.

The book says the Royal Australian Air Force dumped between 12 and 14 44-gallon drums of solid and liquid radioactive waste at sea, about 200 miles north-east of Brisbane, along the Barrier Reef.

The waste came from aircraft flown through radioactive clouds during tests at Maralinga.

CSO: 5100/7535

BRIEFS

NUCLEAR TARGET CHARGE--Canberra.--An Australian uranium enrichment industry could lead to the manufacture of nuclear weapons and the country becoming a target in a nuclear war, the Senate was warned yesterday. The deputy leader of the Australian Democrats, Senator Mason (NSW), said it was possible Australia might eventually have the type of government which would want to make nuclear weapons. Senator Mason was speaking during an urgency debate on the Government's plans to encourage a nuclear industry, including enrichment of nuclear fuel and nuclear power reactors. He said Australia planned to go ahead with a nuclear industry while other Western countries, including the United States, were realising how costly nuclear power was. He claimed the Government had made no clear statement of its plans because it was aware of the opposition to nuclear power. [Text] [Melbourne THE AGE in English 19 May 82 p 15]

ANTINUCLEAR ACTIVISM--Australia could not afford to have a "head in the sand" attitude about its future if a nuclear conflict occurred, the Australian Labor Party state secretary, Mr Peter Beattie, said yesterday. Mr Beattie returned yesterday after attending an international disarmament conference in Japan. He said that Australia should use its special relationship with the United States to press for nuclear disarmament. "Australia, directly or indirectly, will share the consequences of a nuclear conflict," he said. "Australia most definitely cannot afford to have its head in the sand over its future. "I also spoke out at the conference against activities which could heighten the chances of such a conflict taking place. "In particular, representatives from New Zealand, Belau, Vanuatu and myself jointly expressed our opposition to continuing nuclear testing in the Pacific." Mr Beattie said the only option open to peace movements throughout the world was to keep up their calls for disarmament. [Text] [Brisbane THE COURIER-MAIL in English 20 May 82 p 10]

FREMANTLE RADIOACTIVITY STUDY--The transport of radioactive minerals through Fremantle is to be investigated by the city council. Containers of monazite have been freighted for many years to Fremantle from Capel and Eneabba. They are shipped from the port to several countries, including France, Britain and America. According to council officers it was only recent public awareness that had brought the issue to the forefront. The matter was raised at the council's meeting last Monday by Cr John Troy and has been referred to the council's building and planning committee. The chief health surveyor, Mr Brian Bell, said yesterday that the monazite had been passing through Fremantle for the past 16 years. Council officers are currently preparing a report, with the State Mines Department and radiation experts from the State X-ray laboratory, which will examine the storage, transport and safety of the mineral sands. Fremantle City Council was one of the first municipalities to declare itself nuclear-free and recently erected signs on the city boundaries to emphasise its stance. [Text] [Perty THE WEST AUSTRALIAN in English 21 May 82 p 14]

URANIUM ENVIRONMENTAL RESEARCH LAG--Canberra: Environmental research at the Ranger uranium mine in the Northern Territory is being seriously hampered by a lack of staff and inadequate facilities, according to a report tabled in Parliament yesterday. The Australian Science and Technology Council (ASTEC) said that research into safety standards was progressing too slowly. In its report to the Prime Minister, Mr Fraser, ASTEC said that the main causes for slow research were lack of appropriately qualified staff, inadequate laboratory space and low-standard housing. It was said that research was necessary to develop standards at which the minimum amount of contaminants could be safely released from mines in the Alligator river region. "Even with the present 'no release of contaminated water' policy at Ranger, the effect of possible contaminants must be investigated so that minimum standards can be developed and water management plans formulated," the report said. ASTEC said that preparation must be made for the possibility of some accidental pollution. It said that two recent incidents in the region pointed to the difficulty of maintaining perfect control of human endeavour in an area with such extremes in natural climate. The supervising scientists' research programme was set up on the basis of a recommendation of the Ranger uranium environmental inquiry--a commission which sat between 1975 and 1977. [Text] [Perth THE WEST AUSTRALIAN in English 21 May 82 p 24]

URANIUM EXPLORATION EXPENDITURES--South Australia is experiencing a boom in mineral exploration spending, according to figures revealed yesterday by the State Minister of Mines and Energy, Mr Goldsworthy. Spending on mineral exploration has soared five-fold since 1979, with last year's figure of $51.1 million only $3 million less than total spending last decade (1970-79). "In the future, South Australia's energy needs will be met increasingly by coal fired power generation, so this concentration on coal exploration and evaluation is most important," Mr Goldsworthy said. The search for uranium continued to attract attention in South Australia, accounting for 14 per cent of just over $7 million of reported expenditure. [Excerpts] [Canberra THE AUSTRALIAN in English 26 May 82 p 19]

CSO: 5100/7536

SRV JOINS NUCLEAR NONPROLIFERATION TREATY

OW171919 Hanoi VNA in English 1630 GMT 17 Jun 82

[Text] Hanoi, VNA, June 17 -- Proceeding from its consistent policy of peace and in conformity with United Nations statements and resolutions on curbing the nuclear arms race, the Socialist Republic of Vietnam has decided to subscribe to the treaty of nonproliferation of nuclear weapons, declared Deputy Foreign Minister Vo Dong Giang at the second special session of the U.N. General Assembly on disarmament on June 6. Vo Dong Giang pointed out that the U.S. imperialists were exacerbating international tension, undermining East-West detente, stepping up the arms race, and opposing disarmament, national independence and sovereignty, and world peace and security.

"The well-known peace programme adopted by the Communist Party of the Soviet Union at its 26th Congress and the Soviet Union's recent proposals eloquently prove that the Soviet Government places the elimination of the nuclear catastrophe above all other interests," he said. "As a non-nuclear country threatened by a nuclear country, the R.S.V. firmly supports the proposal for an international accord protecting all non-nuclear countries as initiated in 1978," Vo Dong Giang continued.

Vo Dong Giang said: "In the tension now prevailing in many parts of continents, the removal of hotbeds of war has become urgent, the S.R.V. supports the establishments of peace and nuclear-free zones in Latin America, Africa, the Middle East, the Mediterranean, Europe, Northern Europe, the Indian Ocean and Southeast Asia. The establishment of such zones must be based on respect for the interests and aspirations of the countries in these regions and must be free of interference and intimidation by outside powers. As an Asian country, Vietnam welcomes and wholeheartedly supports the proposal made by the Peoples Republic of Mongolia for a convention of non-aggression and renunciation of use of war among the Asian and Pacific countries.

"On Southeast Asia, the Lao People's Democratic Republic representing the other two Indochinese countries at the 36th Session of the U.N. General Assembly, advanced a seven-point proposal of peaceful co-existence among countries in the region. This proposal and others made at the various Indochinese ministerial conferences are still standing. Vietnam will spare no effort to join the other Indochinese countries in discussion with the ASEAN countries for peaceful settlement of conflicts and differences between the Indochinese and A.S.E.A.N. countries through negotiations in the spirit that Southeast Asian problems be solved by Southeast Asian countries themselves on the principles of equality, friendship, mutual respect and understanding, consideration of one another's legitimate interests, common consent, non-imposition, non-interference from outside, without the use of force or threat of force in their relations. This will create favourable conditions for setting up a region of peace, stability and co-operation in Southeast Asia.

The Vietnamese foreign minister said Prince Sihanouk would find his presence in the coalition government to be "a bad thing" for himself. "Twice is too many times," Mr Thach said, alluding to the fact Prince Sihanouk lent the Khmer Rouge his prestige by remaining head of state at the beginning of their regime before they stripped him of the title in 1976 and made him into a virtual prisoner in his own palace.

Some observers here believe that Hanoi might even be quite pleased that Prince Sihanouk, who might have retained some popularity in Cambodia, should have openly compromised himself with the Khmer Rouge, execrated by the population for their extreme cruelty while in power.

CSO: 5100/2198

NUCLEAR DEVELOPMENT FOR MILITARY PURPOSES

PY241635 Paris AFP in Spanish 1259 GMT 24 Jun 82

[Text] Buenos Aires, 24 Jun (AFP) -- The navy commander in chief has authorized Vice Adm Carlos Castro Madero to remain in his post as chairman of the National Atomic Energy Commission (CNEA).

Castro Madero and other navy and air force members resigned their positions in the Argentine Government after the crisis which broke out in the military junta when the army made the unilateral decision to designate (Ret) Maj Gen Reynaldo Bignone president.

The resignations were submitted in the wake of the separation of the navy and the air force from the leadership of the military process which started in 1976.

Castro Madero told Radio Continental today that after Great Britain made use of nuclear submarines in the Malvinas war, Argentina is free to make use of its nuclear development for military purposes.

Castro Madero said: The use of nuclear submarines was a violation of the nonproliferation policy agreed upon by the entire world because it turned into a clear disadvantage for Argentina. As I said in Vienna, Argentina will comply with all its obligations, but from now on it reserves for itself the right to undertake the development of the euphemistically so-called nonproscribed military uses. Until today the safeguard agreements signed by Argentina have not permitted it to undertake nuclear energy development for military purposes.

CSO: 5100/2198

NUCLEAR PROGRAM DROPS TO THIRD PLACE IN PRIORITY SCALE

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 2 Jun 82 p 29

[Text] Brasilia--Energy sector experts yesterday revealed to O ESTADO that the nuclear program has dropped to third place in the scale of priorities, which means a revision of the targets planned by the Geisel administration. They added that is occurring because the Figueiredo administration is convinced that the Brazil-Germany nuclear agreement does not guarantee the transfer of technology to Brazil.

Of the total of 8.585 trillion cruzeiros of investments in the energy sector in the period from 1982 to 1985, 4.621 trillion will be devoted to the generation and transmission of conventional electric energy; 2.589 trillion to the exploration, production and refinement of oil; 776 billion to the nuclear program; 258 billion to the PROALCOHOL program; 116 billion to the production of coal; 50 billion to mining and gasification projects; 66 billion to transportation electrification projects aimed at the replacement of oil derivatives; and 109 billion to various other programs, among them the establishment of energy forests. The figures of those investments are in the same proportion as the degree of priority which the Figueiredo administration wants to give to each sector, the experts said.

They stressed that the doubts regarding the transfer of technology stem from the fact that the nuclear agreement did not guarantee the academic training of Brazilian specialists, instead of the internships which Brazilians are serving in Germany. They are also due, they added, to the fact that the program is being implemented by a German private enterprise, the KWU, which like any private company in the sector is not interested in transferring the nuclear technology of all cycles to avoid having a competitor in the world market.

For all those reasons, they believe that the next administration will revise the Brazilian nuclear program in such a way as to guarantee the transfer of German technology, or to delay it in such a way that there will be time to academically train Brazilian technicians. They observed also that the prediction made by Mario Henrique Simonsen when he left the Planning Ministry in the Figueiredo administration, that "nuclear technology is obtained with investments and intelligence" is being confirmed.

The Investments

The experts explained that the total of 776 billion cruzeiros allocated to the nuclear program until 1985 include the uranium concentrate plant in Pocos de Caldas (Minas Gerais) and the uranium enrichment plant in Resende (Rio de Janeiro). The Resende plant will test the jet-nozzle process on an industrial scale for the first time in the world. Of those funds, 131 billion will be applied this year, 209 billion in 1983, 248 billion in 1984 and 188 billion in 1985.

Of the total of 4.621 trillion cruzeiros allocated to the conventional electric power sector, 570 billion will be applied in the Itaipu hydroelectric plant and 314 billion in the system for transmission of the power to be generated by that plant. The sum of 360 billion cruzeiros was allocated for the Tucurui (Para) hydroelectric plant and 3.377 trillion will be applied in the construction of other hydroelectric plants and transmission systems.

According to the experts, the greatest source for generation of those funds will be the electric energy tariff. For that reason, they explained, the consumer is paying his energy tariff 3 percent above the INPC this year, and beginning in 1983, he will pay 5 percent above the INPC. According to them, these readjustments were the formula that the government found to compensate for the low profitability of the concessionaire companies in recent years.

Of the total of 2.589 trillion cruzeiros of investments in oil, 918 billion are being allocated for exploration, 1.18 trillion for production, 138 billion for refinement, 148 billion for shale, 127 billion for transportation, and 78 billion for other necessary expenditures. Those investments aim at increasing the domestic production of oil and reducing foreign dependence.

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CSO: 5100/2191

KWU SPOKESMAN AFFIRMS GUARANTEE OF TECHNOLOGY TRANSFER

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 9 Jun 82 p 28

[Text] The Brazil-Germany nuclear agreement is being considered by Kraftwerk Union (KWU), the company responsible for the construction of the Angra II and III plants, as a model for cooperation with other countries, which impels it to make every effort to guarantee the complete and efficient transfer of nuclear technology to Brazil. That is what the company spokesman, engineer Wolfgang Breyer, told O ESTADO and JT yesterday, replying to the doubts raised by Brazilian energy sector experts regarding the transfer of German technology in the framework of the agreement signed in 1975.

Breyer pointed out that the "successful transfer of German nuclear technology to Brazil serves the interests of KWU itself." He cited three examples of the accomplishments of the Brazilian nuclear program which, in his opinion, confirm the progress and the success of the transfer of technology:

1. The Brazilian Nuclear Corporation (NUCLEBRAS) subsidiary, the NUCLEBRAS Engineering Corporation (NUCLEN), is carrying out more than 50 percent of the engineering in the first two nuclear power stations of the Brazil-German agreement (Angra II and -III), receiving all the necessary documents from KWU, designs, specifications, standards, computer programs; in addition to 100 technicians trained in KWU and other training being implemented or envisaged with the aim of qualifying NUCLEN for all the tasks of the German company.

2. The Heavy Equipment Corporation (NUCLEP) factory has already been operating for 2 years with the same high nuclear quality as the respective factories in Germany.

3. The NUCLEBRAS fuel elements factory located in Resende (Rio de Janeiro) installed with KWU technology is ready to go into operation.

As for statements of energy sector experts that the KWU was not interested in transferring technology to prevent the emergence of Brazil as an international competitor, Breyer said that "KWU will not lose its market through the transfer of technology."

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CSO: 5100/2191

ANGRA-I WILL NOT OPERATE COMMERCIALLY UNTIL 1983

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 10 Jun 82 p 33

[Text] Brasilia--The president of Furnas, Licinio Seabra, said yesterday at the Ministry of Mines and Energy that the Angra-I nuclear plant will not be able to operate commercially at 100 percent of its power of 626 megawatts until the first quarter of 1983. After speaking with Minister Cals, Seabra acknowledged that the plant may be released for safe operation with its load reduced 50 percent by the end of this year.

Until the first quarter of 1983, Angra-I will continue to undergo tests aimed at correcting the problem that arose in the steam generator. He said that the total cost of that plant is around $2,150 per kilowatt hour, which adds up to a total cost of $1.345 billion. He asserted that the Brazilian Government is not incurring additional expense with the repairs that are being made to the plant because those costs are the responsibility of Westinghouse, the company building the plant. Seabra commented good-humoredly on the remarks that have been made about the plant's problems, recalling that there are some in Rio de Janeiro who call Angra-I the "firefly plant" because it "goes on and off." He gave assurance, however, that the plant will operate without any problem at 100 percent power.

According to Seabra, at the moment Angra-I is being tested at 30 percent full power, and it is probable that it will be shut down at the end of next week for cooling for a period of 45 days. After that period, the plant will be tested again at 50 percent power and then will be submitted again to a third phase of tests at 75 percent power, and only in the first quarter of 1983 will it go into commercial operation, that is, will begin to produce electric energy at its full power of 626 megawatts.

Seabra was reluctant to mention dates for the entrance into operation of the plant pointing out that the reporters later would be citing them whereas the interest of Furnas is to conduct tests without haste "since the market is not in pressing need of energy at the moment.

Uranium

Mines and Energy Minister Cesar Cals said in Brasilia yesterday that the project for construction of a uranium enrichment plant in Itataia, in Ceara, is being prepared to enable the country to begin to export that product. Cals pointed out that when the plant goes into operation in 1992, Brazil may export 3,000 tons of uranium concentrate and 500 Separative Work Units (UTS) of enriched uranium per year.

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CSO: 5100/2191

RESENDE FUEL ELEMENTS FACTORY READY TO GO INTO OPERATION

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 15 Jun 82 p 36

[Text] Brasilia--The factory of fuel elements for nuclear reactors, located in Resende (Rio de Janeiro), is ready to go into operation and will be inaugurated immediately after the Football World Cup Matches, as soon as there is an opening in President Joao Figueiredo's agenda. That is what the president of the Brazilian Nuclear Corporation (NUCLEBRAS), Paulo Nogueira Batista, revealed yesterday, explaining that the factory is the third and last stage of the fuel cycle.

However, according to the president of NUCLEBRAS, the second stage of the fuel cycle will not go into operation until 1984 with the inauguration of the uranium enrichment factory, also located in Resende. Until that factory is ready, the uranium concentrate (yellow-cake) produced in Pocos de Caldas (Minas Gerais) will be processed in France, according to Nogueira Batista.

Very affable, which is not his custom with reporters, the president of NUCLEBRAS explained that Brazil already has two of the three stages of the nuclear reactor fuel cycle. The first phase went into operation at the beginning of this year with the uranium concentrate factory in Pocos de Caldas.

The last two stages--uranium enrichment and production of fuel elements--uses German technology transferred by Kraftwerk Union (KWU), the company that is also responsible for construction of the nuclear plants for the construction of the four other plants envisaged in Plan 2000 [as published].

The uranium enrichment factory will test the jet-nozzle process on an industrial scale in Brazil for the first time in the world. The process was tested on a laboratory scale for 10 years in Germany and also in Belo Horizonte. It consists in the artificial increasing of fissionable uranium (Uranium-235) from 0.7 to 3.2 percent.

The function of the fuel factory will be to transform the enriched uranium into uranium dioxide powder and press that powder in the form of fuel pellets. Each fuel element remains in the reactor for 3 years and has the capacity to produce 135 million kilowatt-hours of electric energy.

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CSO: 5100/2191

NUCLEAR WASTE SITE TO BE LOCATED IN ATAORNA

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 3 Jun 82 p 38

[Text] Rio--The storage site for the low- and medium radioactivity waste from the Almirante Alvaro Alberto nuclear power station will be located on Itaorna Beach itself, "in a stone quarry 100 meters from the plants," it was revealed yesterday by Furnas expert, Wanderley Luiz Desorde, during a discussion sponsored by the Brazilian Society for the Advancement of Science (SBPC) between experts from the nuclear sector and ecologists.

Earlier, the government planned to locate the atomic waste storage site in the district of Xerem, municipality of Duque de Caxias, in the state of Rio, but because of the pressure from environmental protection agencies and scientists, represented by the SBPC, it retreated and the designation of the new site was left in abeyance.

In revealing the new site, the Furnas expert explained that the low- and medium ratioactivity waste, solid as well as the liquid and gaseous wastes, will be solidified in cement and packed in steel drums before being stored at the site.

The problem of lack of information dominated the discussions on nuclear energy and the environment sponsored by the SBPC. During his talk in the auditorium of the Microbiology Institute on Fundao Island, the director of the State Environmental Engineering Foundation, Evandro de Britto, declared that questions on the uranium reprocessing plant were taken to Minister Andreazza because the foundation feared that that plant would pollute the waters of the Paraiba River which "is practically the water reservoir of Rio."

An expert from the National Nuclear Energy Commission (CNEN), Claudio Almeida, pointed out that an "opening" is taking place in the nuclear sector thanks to the experts themselves. Otherwise "the technical-scientific personnel of the nuclear program would run the risk of becoming sclerotized in view of so many prohibitions and so many documents stamped 'secret,' 'confidential,' 'restricted,' in addition to other restrictive rubber stamps that made it impossible to have any comment, research, questions and the exchange of information on a wide range of subjects," he said.

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CSO: 5100/2191

BRIEFS

NUCLEAR FUEL RESEARCH FUNDS--The National Nuclear Energy Commission (CNEN) yesterday received an appropriation of 20.2 million cruzeiros, conveyed through the secretariat general of the Ministry of Mines and Energy, to finance controlled nuclear fusion research at various universities. An agreement to that effect was signed yesterday, in the office of Minister of Mines and Energy Cesar Cals and in his presence, between the secretariat general of the ministry and the CNEN. Researchers who head fusion projects in Campinas and Sao Paulo were also present. The chief of the plasma physics and controlled nuclear fusion group of the University of Campinas (UNICAMP), physicist Paulo Sanaka, declared that within about 10 years the technical feasibility of the construction of a fusion reactor will be confirmed and that within about another 15 years from that date the first prototype of a demonstration reactor will be developed in some country in the world. Commercial reactors will not emerge until around the year 2040. Minister Cesar Cals yesterday also announced the establishment of a national center for plasma physics and controlled thermonuclear fusion to be located in Campo de Roma, in the municipality of Santa Cruz, in Greater Rio. The CNEN will be responsible for administration of that center. [Brasilia CORREIO BRAZILIENSE in Portuguese 10 Jun 82 p 9] 8711

CEARA URANIUM PROCESSING CENTER--Mines and Energy Minister Cesar Cals revealed yesterday that the second half of this year, President Joao Figueiredo will approve his plan to install a large uranium processing center in Itataia, in Ceara, with a view to exporting. The minister said that the plan he explained to the president of the republic provides for the export of 3,000 tons per year of uranium concentrate, the world price of which is $100 per kilogram, and 500 tons per year of enriched uranium, the price of which is $1,780 per kilogram. The minister said that he was fully confident in the successful performance of the technology adopted by Brazil for the enrichment of uranium, namely the continuous jet or jet-nozzle process, and that he is relying on that process for the installation of a large enrichment plant in Ceara with a view to exporting. More than half of the Brazilian uranium reserves known thus far occur in Itataia (137,000 tons). [Brasilia CORREIO BRAZILIENSE in Portuguese 10 Jun 82 p 9] 8711

CSO: 5100/2191

BRIEFS

URANIUM DEPOSITS DISCOVERED--The Peruvian Nuclear Energy Institute has discovered uranium in the Junin Department, in the towns of Huanca and Pando. Therefore, the institute has called for international bids for the exploitation of these deposits. Officials have noted that all work will be carried out at the companies' risk and that under no circumstances the institute will be forced to make any reimbursement if the deposits cannot be profitably exploited. [Text] [PY091701 Lima Radio Union in Spanish 1130 GMT 9 Jun 82 PY]

CSO: 5100/2199

CANCELLATION OF NUCLEAR ACCORD VIEWED AS 'MAJOR VICTORY'

Tehran ETTELA'AT in Persian 2 Jun 82 pp 5, 14

[Text] The issue of the nuclear power plants and the construction of the Bushehr nuclear power plant has once again become "new" in some circles.

International imperialism and the chain of mass media affiliated with it, following the defeat they suffered due to the release of the frozen money resulting from the cancellation of the agreements to build nuclear power plants, pretend that Iran has agreed to build the Bushehr power plant and renew the contract in exchange for the release of its frozen assets.

But these are false notions. To quote the deputy of the Ministry of Energy: On the issue of energy, the decision of the Revolution Council of the government of the Islamic Republic concerning the cancellation of the agreements to build nuclear power plants is still valid and the trickery of the imperialist cartels and trusts will get nowhere in this area, because the revolutionary government and the people of the Islamic Republic of Iran, who have the interests of the Muslim nation at heart in every area, will not accept such enslaving agreements.

The reporters of ETTELA'AT, given the importance of this issue and in order to clarify the ambiguities which exist in this regard, held a series of interviews with Dr Fereydun Sahabi, deputy for energy of the Ministry, and Dr Reza Amrollahi, head of the atomic energy organization of the Islamic Republic of Iran, which you will read in two issues. The first part of this report follows for our dear readers:

Western imperialism, in the guise of companies, agencies, and various atomic concerns, has conspired, through trickery and deception and with the cooperation of their puppet, the treacherous shah, to make Iran a nulear power. Of course, the plan to make Iran a nuclear power was not in the best interests of the development and progress of Iran, but for its plunder, more than ever before.

The magic tricks which have been done in Iran over 20 years by the imperalist witch at the expense of the oppressed Iranian nation, during these dark years as well as at the height of the Islamic revolution, and the neutralization of the 20 years of Western conspiracies in the 2 years of the Islamic revolution of Iran, is another story which should be told at another opportunity.

Among the latest deceits of the Western plunderers was the plan to make Iran a nuclear power, the plan to build a 1,200 megawatt nuclear power plant in Bushehr. After the victory of the revolution of the Muslim nation of Iran, this plan was exposed and with the cancellation of the agreement to build a nuclear power plant in Bushehr, this conspiracy was also neutralized.

Following the cancellation of these agreements, the chain of imperialist companies, with the help of their dependent countries, blocked some of the property and assets of the combative, revolutionary nation of Iran with such excuses as compensation, intending to devour these assets. However, with the persistent efforts of the government of the Islamic Republic of Iran, significant sums of these assets were retrieved from the imperialist plunderers and returned to the government treasury.

The victories which the combative Muslim nation of Iran enjoyed in this way caused certain rumors, such as compromising with the foreign contractors to build this power plant. In order to clarify these ambiguities and declare that any compromise in this regard is untrue, noting that the people and the government of Iran will never accept the thesis of "atoms for peace" from a belligerent country such as the United States, we held an interview with Dr Fereydun Sahabi, the deputy for energy of the Ministry of Energy, and Reza Amrollahi, the director of the atomic energy organization of Iran, who clarified all the facts and declared all the rumors to be false.

The Government Policy and Nuclear Energy

Dr Fereydun Sahabi pointed out the wrong, incoherent policy of the previous regime in regards to energy, explaining the necessity for order and coherence in the government policy after the revolution in this regard, and said: "After the revolution, it was felt that we urgently needed to act on the basis of a coherent program which would be worthy of the Islamic Republic and the Islamic revolution of Iran, by creating coordination among the responsible organizations of energy. Hence, after much effort, the economic council approved the establishment of an 'energy council.' On the basis of the existing standards and regulations, in regards to every issue concerning any kind of new energy, an authority must decide and offer a coherent plan. That authority is the 'energy council.' In regards to nuclear energy, too, the energy council will make decisions. After a great deal of study of energy production and the possibility of producing conventional energy and its abundance in Iran, if the new source of energy is found by the energy council to be economically more feasible and necessary, Iran will decide to produce it and the related organizations will begin to work . . . ."

Concerning the Bushehr nuclear power plant and the cancellation of the agreement, Dr Sahabi said:

"Concerning nuclear energy, especially in connection with the Bushehr nuclear power plants, after the revolution, a great deal of study and examination was done. Contrary to what is heard, that 'the closure of Bushehr nuclear power plants' was an immature, unilateral decision, I believe that this decision was correct and quite logical. The issue was raised in the circles of the experts of the country and most of the university professors and experts examined the issue (in regards to whether or not having nuclear power plants is appropriate to the conditions of Iran today). The conclusion of these studies was in the negative. That is, having the Bushehr nuclear power plants, which would be very costly, was not considered to be beneficial and in the best interests of the country. At least, it did not seem necessary to start until some time in the future.

"When this decision was made, the energy council was not active but the expert organizations, as the technical arm and group of experts, studied the issue. The Revolution Council and the Cabinet of the time, which were at that time the most logical and legal decision-making organizations, approved this decision.

"At present, the decision of the Revolution Council and the Cabinet of the time in regards to the Bushehr power plants is still valid.

"If it is felt that it is urgently vital that the issue be studied again, it must be referred to the energy council. The technical branch of the energy council will, after study, announce the results to the energy council so that the energy council can make a decision in this regard. The issue of nuclear power plants is different from that of other power plants in that it also has a political dimension. Therefore, if we want to have nuclear energy for political reasons, we must realize that merely our having it will not make us rich, since we do not have the technology for creating nuclear energy, and consequently we will be faced with industrial dependence, dependence in production, fuel supplies, and upkeep, as well as political and economic dependence, and, most importantly, dependence in the area of security for the power plants in connection with environmental protection."

How to Enter Nuclear Technology

In this interview, Dr Fereydun Sahabi explained the logical methods to enter nuclear technology and said: "Nowhere in the world have steps been taken to purchase a 120 [as published] megawatt power plant without taking into consideration the abovementioned issues. In building up this industry, they started with very small experimental and research reactors, with power plants with a 5, 10, or a maximum of a 30 megawatt capacity, which can be controlled, are useful, and are educational to build. Hence, it is also better for us, before getting involved with giants of 1,200 megawatts of power, to first begin by learning this technology through educational and research programs and the like which can be controlled.

"May God bless martyr 'Abbaspur. Last year in a seminar on building nuclear reactors, which was held in Esfahan through the efforts of the nuclear energy organization, he made the point that we should start with small power plants and insisted on it. Martyr 'Abbaspur insisted that we should not return to the dependencies of the previous regime."

Insistence of Martyr 'Abbaspur on Cancellation of Agreements

About the role of martyr 'Abbaspur and his decisive position in regards to the cancellation of the agreement for the Bushehr nuclear power plants, Dr Fereydun Sahabi said: "Martyr 'Abbaspur continually emphasized the cancellation of the agreement for the Bushehr nuclear power plants. In a seminar examining dependencies, the provision of electrical energy, and the difficulties of the transmitter lines of the Bushehr power plants, martyr 'Abbaspur was one who actively participated in the various committees. Before he took over his post in the Ministry of Energy, he participated in related committees as an expert, along with his colleagues from the Industrial University. During the administration of martyr 'Abbaspur in the Ministry of Energy, he made a clear, sound decision based on his total attention to the various dimensions of the issue, especially the dependency aspects regarding the power plants, the difficulties in regards to the transmitter line, the location of the power plant outside the place where the electricity is used, the upkeep problems, the possible future technical problems. and the problems that it would cause concerning the transmitter line and the national network. Rightly, martyr 'Abbaspur called the cancellation of the Bushehr nuclear power plants a victory and an important gain for the revolution."

The Defeat of Cartels

Dr Fereydun Sahabi, the deputy for energy of the Ministry of Energy, said concerning the international repercussions caused by the cancellation of the agreement for the Bushehr nuclear power plants: "Large Western countries and large international cartels expected much profit from the contracts and programs to build 23 nuclear power plants in Iran. The cancellation of these plans and the disruption of the contract to build the Bushehr power plants disrupted their sweet dreams. Since that time, significant stagnation seems to have marked the nuclear fuel industry and its market throughout the world. One of the manifestations of this stagnation is the unprecedented drop in the price of "uranium" and the tremendous decrease in orders for nuclear power plants. The contractor for the Bushehr power plants has not received another order since the cancellation of this agreement. This is the greatest defeat for the international cartels and the capitalist world, who have had their greedy eyes on countries such as Iran, because since that date, other developing countries have become more alert and aware in signing such agreements. Hence, the cancellation of the agreement for these nuclear power plants in Iran had a worldwide effect which can only be considered a positive and constructive effect of the Islamic revolution of Iran especially on the Third World.

Answer to Slander

Unquestionably, the enemy writhes because of this defeat and will not stop at any trick to gain its illegitimate interests. After the cancellation of the nuclear accords for Bushehr and other parts of Iran, the contractors and companies involved in the agreements took a hostile position against Iran and the Islamic Republic of Iran, which included the freezing of some of Iran's assets in France. After much effort and strong reasoning in the courts of France, the Islamic Republic of Iran successfully freed some of its money from the blockage in two cases, the most recent of which was a sum of $1 billion. Defeated Western capitalism tries to pretend through its servants that Iran has agreed to the construction of the Bushehr power plant in exchange for its freed assets. The answer of the deputy for energy of the Ministry of Energy neutralizes this slanderous and unjust rumor.

Dr Sahabi said in this connection: "The freeing of $1 billion in Iranian assets has no connection with the issue of the Bushehr power plants. The sum in question was a loan that the government of Iran had previously given to the atomic energy commission of France.

The above-mentioned company acted to freeze the Iranian loan and because of the situation in the French government and its extremely reactionary position against Iran and the Islamic revolution of Iran, this loan was frozen. In fact, it can be said that the government of Iran had extended this loan to the French government itself, because the French atomic energy commission is a government organization and the French government had guaranteed this loan. The Paris court first endorsed this blockage, but the second time the issue was raised, the French commerce and appeals court recognized the guarantee of the French government. This is a great defeat for the (Avardif) company and the French atomic energy commission. Now, the French government is responsible for repaying the loan with interest, if, of course, the recipiant of the loan declines to pay it. This is also a victory for the revolution and the Islamic Republic of Iran.

The related institutions and organizations will take the necessary legal and judicial steps to "update" the loan and its interests or its return or activate the loan and have the recipiant pay the interests.

9593
CSO: 5100/5303

NEW CORPORATION TO CONTROL NUCLEAR ACTIVITIES

MB231012 Johannesburg Domestic Service in Afrikaans 0600 GMT 23 Jun 82

[Text] As of 1 July, all state-financed nuclear activities in South Africa are to fall under one body, to be known as the Atomic Energy Corporation of South Africa. The announcement was made in Pretoria by the minister of mineral and energy affairs, Mr F.W. de Klerk.

The Atomic Energy Corporation is being created under the Nuclear Energy Act. Mr de Klerk said the corporation's board of directors will consist of the current president of the Atomic Energy Board, Dr J.W.L. de Villiers, who will serve as the first full-time executive chairman, and eight other members.

They are the director-general of mineral and energy affairs, Mr S.J.P. Du Plessis; the chairman of the Nuclear Fuel Corporation and former president of the Chamber of Mines, Mr D.A. (Etheridge); the chairman of the Phalaborwa mining group, Mr J.A. MacMillan; the chairman of the Electricity Supply Commission, Mr J.H. Smith; the managing director of the South African Coal-Oil and Gas Corporation, Mr J.A. Stegman; the chairman of the telephone manufacturers of South Africa, Dr N. Stutterheim; South Africa's former ambassador in Washington, Dr Donald Sole; and the director-general of foreign affairs and information, Mr Hans van (Dalsen).

Mr de Klerk said that with the establishment of the new corporation, the Uranium Enrichment Corporation [UCOR] and the Atomic Energy Board will be reestablished as full subsidiary companies of the Atomic Energy Corporation. The current managing director of UCOR, Dr W.L. Grant, will retain his position when UCOR becomes a subsidiary. The current vice president of the Atomic Energy Board, Dr J.P. Hugo, will be appointed managing director of the Nuclear Development Corporation, which is what the board will be called once it becomes a subsidiary. Mr de Klerk paid tribute to Dr Ampie Roux, chairman of UCOR, and the father of the country's nuclear and energy research development program, who recently announced his retirement.

CSO: 5100/2198

NORMANDY ENLARGES ROLE AS NUCLEAR REGION; PLANTS DESCRIBED

Paris L'USINE NOUVELLE in French 20 May 82 p 69

[Article: "The Nuclear Boom"]

[Text] While its neighbor Brittany has turned its back on nuclear energy, Normandy has resolutely committed itself to it. Three nuclear power plants of the 1300-MW generation are now under construction there: two in Upper Normandy--Paluel and Penly; and one in Lower Normandy--Flamanville. There is also the reprocessing plant at La Hague, located like Flamanville in the Nord-Cotentin department. This plant is now being enlarged.

Normandy is now on the way to becoming the second nuclear region of France, and at the same time it will begin to export electricity instead of having to import it from other regions. But before reaching that point, it will have spent a long time on construction at its nuclear plant sites: 13 years will separate the start of work at the Paluel site in the spring of 1976 from the completion of Penly in early 1989.

What is the status of the work at these huge construction sites now? At Paluel, the first unit is now being tested. Units II and III are in the electromechanical assembly phase, and unit IV is having concrete poured. In theory, everything will be completed by the end of 1985. At Penly, where one unit has been decided on for the time being, the earth-preparation work is now being completed. The first concrete pouring is scheduled for August. Flamanville I is just beginning its electromechanical work, and Flamanville II is in the "unit" civil engineering phase (date for start of service: 1985).

The cost for EDF [French Electric Power Company] of building these three plants will be (in current value) 35 billion francs (seven units estimated at 5 billion per unit). To this figure should be added several hundred million francs for developing equipment, some of which is paid for by EDF, with the balance (for equipment such as schools, housing, etc.) being paid by the local communities.

What are the direct spinoffs of this vast program for regional industries ? As of 1 January, Paluel and Penly had provided 2 billion francs worth of work for companies in Upper Normandy; by the same date, in Lower Normandy, the work done by local firms for the construction of Flamanville amounted to close to 1 billion francs. In addition to direct contracts from EDF, these figures include subcontracts and work on related facilities (see the following table). Could more money have been earned by local firms, since in any event, contracts that are considered to be "grouped" (such as the nuclear boiler and turbo-alternator, which make up 57 percent of the cost of a plant) are not accessible to businesses in the region? That is hard to say. In Normandy, as elsewhere, the participation of local companies depends on the attitude of EDF and the major national groups working on the site, but it also depends on the capability and determination of the region to get itself organized. In Upper Normandy, after some problems at the time the Paluel construction site was started, the creation of a "nuclear energy information cell" at the initiative of the CRCI [Regional Chamber of Commerce and Industry] helped to turn the situation around. The industrial possibilities of the region were inventoried, businesses were informed about the content of bids being prepared, EDF was given a list of local businesses which could be consulted, etc. This cell plays the essential role of a conveyer belt between local firms and EDF's Clamart equipment region which is in charge of the Paluel, Penly, and Flamanville construction.

"EDF did play its game," says Jacques Hoppe, who fills a similar function at the CEBANOR [Committee for the Economic Expansion of Lower Normandy]. But in his view, Flamanville is finished, or almost: "Most of the direct contracts have already been awarded. Only subcontracting work, especially some at the site, still holds out some possibilities of interest." The one opportunity left for the Cotentin and Lower Normandy area is that La Hague is there to take over now.

Based on the economic conditions of July 1981, the expansion of this reprocessing plant requires an investment of 23.5 billion francs, to which have to be added 1 billion for development of the region (roads, community facilities, etc.). That is over twice the cost of Flamanville!

3 Billion Francs for Local Industries
(Amount of contracts awarded as of 1 January 1982; in billions of francs, current value)

	Upper Normandy		Lower Normandy
	Paluel	Penly	Flamanville
Direct contracts for construction work (including civil engineering and public works)	571.8 (420.8)	80.3 (52)	389.4 (277.4)
Housing (equipment and operation)	206.7	22.1	76.6
Specific equipment for large power plant sites	68.8	14.9	27.3
Subcontracting and supplies	492.5	216.2	192.1
Loan contracted with the CNE [expansion unknown] for anticipated equipment	134	25.5	85.4
Estimated amount of commitments made independently of EDF (HLM [Low Cost Housing] units, etc.)	116.2	56.3	209.2
Total	1,590	415.3	980

According to the COGEMA [Nuclear Materials General Company] planning, local and regional industries (building, mechanics, boiler construction, services) should be able to provide about 2 billion francs worth of work to this program. In any event, at the site the "mobilization" has already taken place. A technical-economic division has been established as part of the CEBANOR, which acts as a sort of middleman between the SGN [expansion unknown], a COGEMA subsidiary, which is prime contractor for the project, and the local industries. Furthermore, two public works groups have been established. In addition, some slag industries (Goavec in Alencon, Maisonneuve in Cerences, and Simon Freres in Cherbourg--which already is working as a

COGEMA subcontractor), based on their experience in using stainless steel, have joined in the competition for this work.

The vast site at La Hague has barely gotten off to a start. It will last until 1989 and during its peak in 1984, it will employ 4,000 people, of whom 1,500 to 2,000 will be local workers.

7679
CSO: 5100/2182

END

JPRS 81355

23 July 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 153

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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23 July 1982

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 153

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AUSTRALIAN STAKE IN U.S. URANIUM ACTION DISCUSSED

Melbourne THE AGE in English 28 May 82 p 15

[Article by Nigel Wilson]

[Text] Australian diplomats and trade officials are lobbying strongly in the United States to block legislation which threatens Australia's international uranium market.

Uncertainty about the legislation is one of the reasons why Esso decided to terminate an agreement with Western Mining Corporation covering the development of the Yeelirrie uranium deposit, north of Kalgoorlie.

Government sources yesterday said that if the US went ahead with a proposal which limited foreign uranium imports there could be significant pressure on markets for uranium in Europe and Japan.

The trouble arises from an amendment to legislation for the US Nuclear Regulatory Commission, passed by the US Senate in March.

Senator Domenici, a Republican from New Mexico, successfully proposed that in future, nuclear generation plants in the US would have to source at least 80 per cent of their uranium requirements from domestic mines.

The Nuclear Regulatory Commission legislation was also passed by the House of Representatives, but without Senator Domenici's amendment.

Now, a Congressional committee is trying to decide whether the amendment can be accepted as part of the final legislation.

Senator Domenici's State contains uranium mines which, Australian officials claim, are high cost. Because of the present low spot prices for uranium — about $US23 a lb. — some of the mines are becoming uneconomic.

Earlier moves by Senator Domenici to have the US re-impose a total embargo on uranium imports, similar to that of the early 1970s, were opposed strongly by Australia.

The than ambassador in Washington, Sir Nicholas Parkinson, informed the US Government last September that Australia would regard such a move as a severe restraint of trade.

The Domenici amendment is regarded seriously because of its specific nature. It would require each and every power utility to limit its foreign uranium purchases to 20 per cent total demand.

This is far more severe than limiting total US demand to 20 per cent imports, which would allow foreign companies to arrange substantial contracts with individual utilities even if these amounted to more than 20 per cent of that utility's demand.

One source said yesterday that uncertainty surrounding the Domenici amendment was "not irrelevant" in Esso's decision to reassess its involvement in the Yeelirrie project.

Under the terms of its agreement with WMC, Esso would have been responsible for marketing at least 50 per cent of the output. Even though Yeelirrie is likely to be a low production cost mine — probably among the cheapest anywhere in the world — this advantage would be irrelevant if Esso was unable to find markets in its home country. But WMC's chairman, Sir Arvi Parbo, remains confident that new partners will be found to replace Esso, probably from Europe. He stresses that Yeelirrie is still extremely attractive because of its cost structure.

Traditionally, Australian Uranium has been sold on long-term contracts rather than the spot sales that have sustained uranium production in the US.

Australian officials fear that if the US limits foreign uranium as severely as the Domenici amendment proposes, a lot of uranium now sold on the US market would become available in the rest of the world.

There is particular concern that such displacement could affect arrangements to sell Australian uranium to Japan and France.

Under current policy, the US would phase out completely its restrictions on foreign uranium by 1984.

If the US nuclear demand pattern had continued along the curve predicted only three years ago, the removal of the restrictions would have opened the US to cheap cost uranium produced in Australia.

This, in turn, would have led to new Australian mines being developed.

CSO: 5100/7537

POLITICAL FACTORS IN ROXBY DOWNS URANIUM MINE NOTED

Opposition of Democrats

Canberra THE AUSTRALIAN in English 31 May 82 p 15

[Article by Alex Greig]

[Text] AUSTRALIAN Democrat Mr Lance Milne, who holds the key vote in the South Australian Legislative Council on the future of the massive Roxby Downs uranium-copper project, has indicated he will veto the scheme.

He has called for the whole program of uranium mining in Australia to be wound down and stopped.

Roxby Downs development partners Western Mining and BP Australia say uranium mining is fundamental to the viability of the huge enterprise.

Mr Milne called for the uranium moratorium while addressing a Make South Australia Nuclear Free march, in Adelaide on Saturday.

The rally was organised by the Campaign Against Nuclear Energy (CANE).

Mr Milne said he was against further mining of uranium because it inevitably led into the entire nuclear fuel cycle, ending in the creation of highly radioactive waste products, most of which were out of control.

An Indenture Bill, committing the SA Government to $50 million in infrastructure spending for the project and other undertakings to the partners, will go before the session of State Parliament starting tomorrow.

Labor-Employers Dispute

Canberra THE AUSTRALIAN in English 1 Jun 82 p 3

[Text] **EMPLOYERS** in South Australia yesterday launched a campaign supporting development of the controversial and politically sensitive Roxby Downs mining venture, angering the State Labor Party.

On the eve of a parliamentary session which will determine the fate of the multi-billion dollar project, the ALP branded the campaign "grossly improper" and an unwarranted, politically-motivated intervention.

An incensed Opposition leader, Mr John Bannon, made a scathing attack on the campaign, branding it "dishonest and scurrilous", before meeting the general manager of the State's Chamber of Commerce, Mr Arnold Schrape.

Posters being distributed by employers suggest that a go-ahead for Roxby Downs will mean an extra 15,000 jobs in South Australia, a claim described by the ALP as "only one of the major misstatements made".

Mr Bannon said the Labor Party would now think twice before having any dealings with the participants in the employers' campaign.

The ALP and Democrats insist they will reject passage of a crucial bill paving the way for the project to go ahead.

The unyielding anti-uranium posture has made Roxby Downs one of the most contentious political issues in the State's history.

CSO: 5100/7537

BRIEFS

URANIUM MINING COMPANY CHANGE--URANIUM and Nickel Exploration NL shareholders yesterday passed resolutions changing activities of the group. Shareholders of the small Perth-based explorer approved a change of name to Western United Holdings Ltd and a change of company status from no liability to one limited by shares. In March, UNE announced it would be swapping its mining leases for a brickworks and a place on the industrial boards. UNE will buy a 55 per cent stake in Dingup Bricks Ltd., a developing brickworks in south-west Western Australia, for $100,000 cash and 1.5 million shares. The withdrawal of UNE from direct exploration activities will not take it completely out of the mining area. Associate company, Kia Ora Gold Corp, will buy UNE's mining tenements for $50,000 cash as part reimbursement for exploration spending and the issue of 4.5 million 25c vendor shares. UNE already has a holding in Kia Ora and the increased sale of the tenements will give it a continued, but indirect, involvement with mining. [Text] [Canberra THE AUSTRALIAN in English 1 Jun 82 p 17]

CSO: 5100/7537

REPORT ON RAO'S SPEECH TO UN DISARMAMENT MEET

Madras THE HINDU in English 12 Jun 82 p 9

[Article by R. Chakrapani]

[Text] UNITED NATIONS, June 11. At the special session of the U.N. Assembly on disarmament, India will move for the adoption of a draft convention seeking to prohibit the use or threat of use of nuclear weapons. At the same time, it will support the proposal for freezing nuclear arsenals at their present level.

The External Affairs Minister, Mr. P. V. Narashimha Rao, made this known in the course of his comprehensive statement covering all aspects of disarmament in the Assembly today. His speech underlined the imperative of tackling the problem of nuclear disarmament as a matter of urgent priority.

Mr. Rao said the Assembly had accepted that priority and emphasis should be assigned to nuclear disarmament. This should never be allowed to be diluted, eroded or wittled away. "It is India's conviction that the focus of disarmament must be clearly directed on nuclear weapons and other weapons of mass destruction." This did not imply that India was not attaching importance to the ever-spiralling arms race in conventional weapons which was a matter of concern too.

In his speech, Mr. Rao elaborated on certain aspects of the message of the Prime Minister. Mrs. Indira Gandhi (see Page 7) marking the holding of the second special session of the Assembly devoted to disarmament.

'Freeze' movement spreads: The External Affairs Minister's emphasis on declaring a freeze on nuclear arsenals was in tune with a burgeoning popular movement in the industrialised countries for such a freeze. The "freeze" movement has spread to U.S. Congress where some of the Senators like Mr. Edward Kennedy and House members are working for passage of a motion in favour of the freeze. On Wednesday, however, they suffered a reverse when the Senate Foreign Relations Committee rejected a motion calling for imposing a freeze on nuclear arsenals.

Mr. Rao said the sense of insecurity arising from the nuclear menace was not restricted to developing countries but the industrialised world too. "The recent spontaneous and mammoth demonstrations and increasingly popular movements, most of them free from political or party motivation, opposing all nuclear weapons 'per se', bear testimony to the newly awakened realisation in those countries that the so-called stability of deterrence cannot be depended upon," he said.

"This realisation represents a crucial change in old beliefs and is by itself becoming a powerful force in the struggle for disarmament," Mr. Rao proposed that the freeze should be followed by an immediate suspension of all nuclear weapons tests in all environemtns.

The Minister touched upon other issues related to disarmament. He said nuclear weapon free zones proposal had become "unrealistic" in the context of the wider threat arising from the nuclear arsenals of the weapon States and from clandestine nuclear arsenals allegedly built by Israel and South AFrica.

Finally, he welcomed the decision of the United States and the Soviet Union to resume the suspended talks on strategic arms limitations. He urged that the scope of their dialogue should be enlarged to cover all nuclear weapons systems. They should commit themselves to abide by the treaties already entered into in the area of nuclear disarmament.

Mr. Rao announced his country's contribution of Rs. 10 lakhs to the world disarmament campaign.

CSO: 5100/7112

INDIA, GDR REPORTED PLANNING NUCLEAR COOPERATION

New Delhi PATRIOT in English 13 Jun 82 p 6

[Text] Nuclear collaboration between India and the German Democratic Republic (GDR) is in the offing, reports PTI.

A two-member delegation from GDR had specially come to India to discuss collaboration in nuclear field.

The team had talks early this week with Chairman of the Atomic Energy Commission H N Sethna in Bombay.

The details of the talks are kept secret. Officials sources here said that some agreement has been reached after talks with the atomic energy officials

The GDR team is led by Dr Harry Menz, Director in the Ministry of Science and Technology. He is accompanied by Dr Heinz Hillmann, Director General of the GDR Academy of Sciences.

In an interview in the Capital on Friday, the GDR team declined to discuss the nuclear agreement.

When asked about specific Indo-GDR collaboration in nuclear field, Dr Menz said: "ask the question to Mr Sethna."

Dr Menz said that if India made any specific proposal in the nuclear field "we will examine it."

Collaborative proposals in nuclear and other areas in science and technology are likely to come up at the fifth Indo-GDR joint commission meeting to be held in Berlin in September.

While in Delhi, the team held two meetings with officials and Secretary to the Department of Science and Technology (DST) Dr S Varadarajan.

DST sources said the meetings were meant to review the ongoing joint science and technology projects in preparation for the joint commission meeting in Berlin.

Under an agreement signed last year, 13 joint projects are currently in progress.

Dr Hillmann said the projects cover basic and applied research in areas including food preservation, low temperature work, catalysts, petrochemicals and archaeology.

Some projects are of commercial nature in the fields of high voltage technology, machine tools and opencast mining of coal, Dr Menz said.

Dr Hillmann said India has shown interest in the technology of producing varitus glasses.

DST sources said that India had included some new areas for joint work which will be finalised in the Berlin meeting.

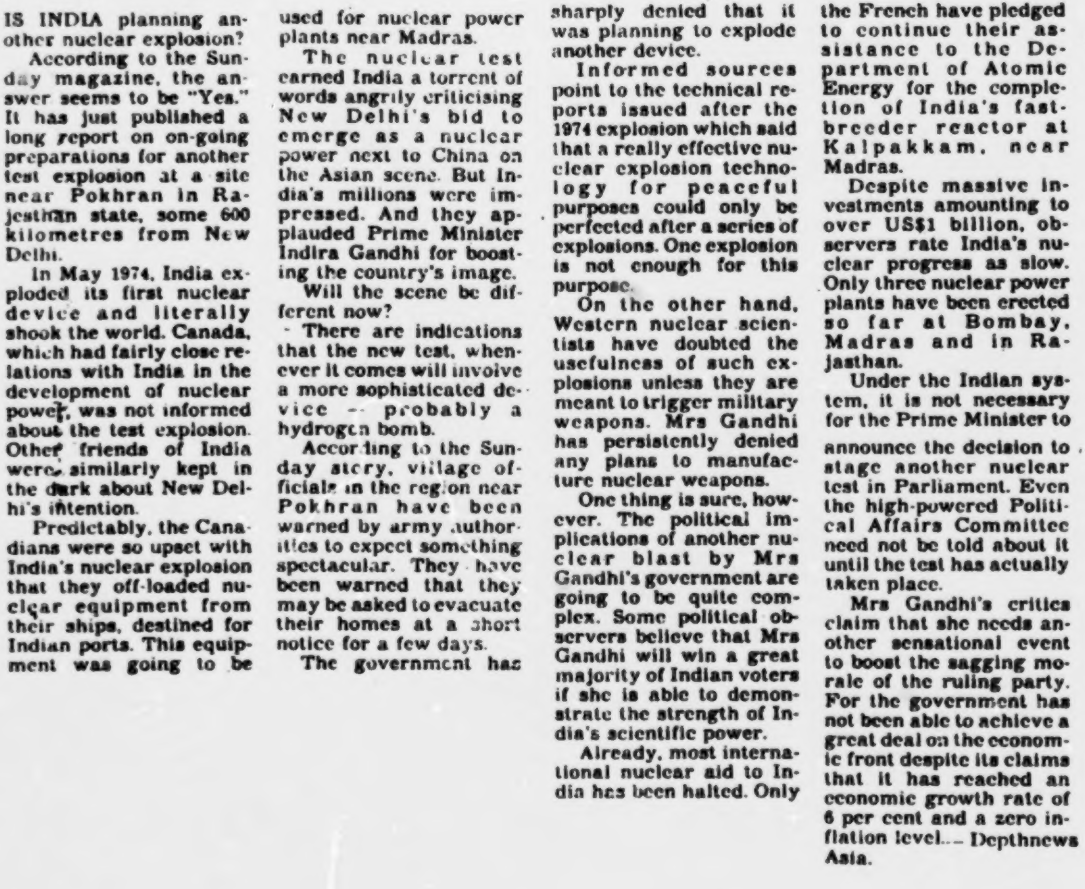
CSO: 5100/7113

NEW DELHI MAY BE PLANNING NUCLEAR TEST EXPLOSION

Kuala Lumpur BUSINESS TIMES in English 9 Jun 82 p 19

[Article by Prakash Chandra in New Delhi]

[Text]



IS INDIA planning another nuclear explosion?

According to the Sunday magazine, the answer seems to be "Yes." It has just published a long report on on-going preparations for another test explosion at a site near Pokhran in Rajesthan state, some 600 kilometres from New Delhi.

In May 1974, India exploded its first nuclear device and literally shook the world. Canada, which had fairly close relations with India in the development of nuclear power, was not informed about the test explosion. Other friends of India were similarly kept in the dark about New Delhi's intention.

Predictably, the Canadians were so upset with India's nuclear explosion that they off-loaded nuclear equipment from their ships, destined for Indian ports. This equipment was going to be used for nuclear power plants near Madras.

The nuclear test earned India a torrent of words angrily criticising New Delhi's bid to emerge as a nuclear power next to China on the Asian scene. But India's millions were impressed. And they applauded Prime Minister Indira Gandhi for boosting the country's image.

Will the scene be different now?

There are indications that the new test, whenever it comes will involve a more sophisticated device -- probably a hydrogen bomb.

According to the Sunday story, village officials in the region near Pokhran have been warned by army authorities to expect something spectacular. They have been warned that they may be asked to evacuate their homes at a short notice for a few days.

The government has sharply denied that it was planning to explode another device.

Informed sources point to the technical reports issued after the 1974 explosion which said that a really effective nuclear explosion technology for peaceful purposes could only be perfected after a series of explosions. One explosion is not enough for this purpose.

On the other hand, Western nuclear scientists have doubted the usefulness of such explosions unless they are meant to trigger military weapons. Mrs Gandhi has persistently denied any plans to manufacture nuclear weapons.

One thing is sure, however. The political implications of another nuclear blast by Mrs Gandhi's government are going to be quite complex. Some political observers believe that Mrs Gandhi will win a great majority of Indian voters if she is able to demonstrate the strength of India's scientific power.

Already, most international nuclear aid to India has been halted. Only the French have pledged to continue their assistance to the Department of Atomic Energy for the completion of India's fast-breeder reactor at Kalpakkam, near Madras.

Despite massive investments amounting to over US$1 billion, observers rate India's nuclear progress as slow. Only three nuclear power plants have been erected so far at Bombay, Madras and in Rajasthan.

Under the Indian system, it is not necessary for the Prime Minister to announce the decision to stage another nuclear test in Parliament. Even the high-powered Political Affairs Committee need not be told about it until the test has actually taken place.

Mrs Gandhi's critics claim that she needs another sensational event to boost the sagging morale of the ruling party. For the government has not been able to achieve a great deal on the economic front despite its claims that it has reached an economic growth rate of 6 per cent and a zero inflation level.—Depthnews Asia.

CSO: 5100/8106

BRIEFS

NUCLEAR ENGINEERING TRAINING OFFERED--Senior high school graduates are being offered the opportunity of becoming nuclear engineers, a field regarded as new and which is to be offered by the Technology Faculty of the Gajah Mada University in Yogyakarta together with the National Atomic Energy Agency (BATAN). P.S. Siregar, information officer of the North Sumatra Regional Office of the Department of Education and Culture, disclosed on Friday [14 May] that in view of the continually increasing energy requirements coinciding with the advances made in development, particularly in electric power development, the role of nuclear energy becomes a major consideration in the coming period. According to a clarification from the Gajah Mada University, nine nuclear-powered electric power stations (PLTN), with a total capacity of 6,600 MW, must be in operation by the year 2000. The first PLTN is expected to be operational in 1989. Other fairly important sectors are nuclear radiation information and isotope radioactivity on an industrial scale such as for food preservation, sterilization of industrial products, revamping industrial processes, and so on. "By the year 2000 Indonesia will need an additional 3,000 nuclear engineers," Siregar said, quoting information from the Gajah Mada University Nuclear Technology Field Office. He admitted this field still sounds foreign to the ears of students in North Sumatra. Moreover, only 75 university students were accepted in this field between 1977 and 1980. In 1981 55 students were accepted. By December 1981, 23 nuclear engineers were graduated in this field. This field will produce engineers who are ready to use and are capable of handling the principles of planning, construction, operation, and maintenance of a nuclear power center. Further they will be capable of understanding the characteristics of nuclear power resources and can plan the processing and application of nuclear radiation including isotope radioactivity on an industrial scale. [Excerpts] [Jakarta HARIAN UMUM AB in Indonesian 15 May 82 p 3] 6802

CSO: 5100/8105

PAKISTAN'S CAPABILITY OF 'GOING NUCLEAR' DISCUSSED

Bombay THE TIMES OF INDIA in English 11 Jun 82 p 8

[Article by S. K. Sharma]

[Text] MR. RAVI RIKHYE deserves to be congratulated on raising the level of debate on Pakistan's nuclear capability. However, what we are attempting to analyse and assess is not whether Pakistan will go nuclear in a year or two, nor the implications of such a development for India. Nor are we discussing whether Pakistan can sustain a weapons programme without breaking the IAEA safeguards on Kanupp. Our focus of analysis is whether, given the current circumstances and known facts. Pakistan has the capability to go nuclear. This, in turn, really means whether Pakistan has had access to weapon grade fissile material — either weapon grade Plutonium 239 or weapon grade Uranium 235.

It is not disputed that there has been some dislocation in Kahuta. How long it will last and what would be its impact on the uranium enrichment process, we are unable to assess at this stage. Consequently, the assessment has to be that Pakistan is still attempting to reach the capability to produce weapon grade uranium though there have been difficulties and interruptions in its effort. Since Pakistan does not have an enriched uranium light-water reactor at present and even if it gets one at Chashma the fuel supply will be tied up with the reactor supply, the enrichment project cannot be deemed to be for peaceful purposes. It is therefore reasonable to assume that at some time in not too distant a future, Pakistan will attain the capability to produce weapon grade enriched uranium.

Let us not adopt towards the Pakistanis the attitude which the Americans had displayed towards the Russians in 1945 when they considered that the Soviets would not be able to reach nuclear capability for twenty years. The Pakistanis are as good as we are except that they had a late start.

Kanupp Reactor

It is not disputed that reactor grade plutonium is not suitable for weapons. In fact, the Americans had drawn a red-herring across the trail on this score as part of a general disinformation campaign in order to tighten their technological hegemony. No one therefore expects Pakistan to attempt to carry out a nuclear test with reactor grade plutonium.

The issue therefore boils down to whether Pakistan has access to weapon grade plutonium. It is not in dispute that the only source for this is the Kanupp reactor. There is evidence to show that some diversion has occurred there already. Pakistan has set up a hot cell reprocessing unit in Pinstech which is working with an annual capacity of 10-05 tonnes and is not under any safeguards. That this hot cell has been in operation was first made known by the Dutch government report of 1979.

The pilot plant in Pinstech is, contrary to what Mr. Rikhye says, not under safeguards. Had it been safeguarded, the IAEA would surely have known if any diversion was taking place, in categorical terms. In fact the reason why additional IAEA safeguards have become necessary in Kanupp is that the Pinstech unit is outside IAEA surveillance.

Another complicating factor has been added since 1980 when Pakistan reportedly began fabricating its own fuel rods to be loaded in Kanupp, and even this unit did not come under IAEA safeguards. Naturally the IAEA has no way of keeping track of the fuel rods being loaded in Kanupp. The agency is on record as having admitted that the number of fresh fuel bundles cannot be verified.

Mr. Rikhye's point about the fuel rods being "stamped with IAEA approved numbers" does not make sense because by stamping numbers the IAEA will also have the count as well. But since this is not so, what is the relevance of mentioning this? Similarly in the light of the agency's own statement, the story about a computer keeping record of refuelling is incomprehensible. If there had been such foolproof arrangements, there would have been no need for the IAEA either to express concern or insist on additional safeguards as it is now doing.

Camera Failure

In the next stage when the irradiated/spent fuel rods are removed to the storage pool further surveillance is necessary. The camera failure mentioned in Mr. Rikhye's article, in fact, occurred in the storage pool and not in the reactor. Hence the premise on the basis of which he has advanced arguments is not sustainable. That is the reason why the IAEA inspectors are not confident of detecting any diversion. In fact the camera failure lasted for several months before being discovered in late 1980. The attempts by the agency to install new surveillance equipment in Kanupp have so far not succeeded due to disagreement with the Pakistani government.

This was the first occasion in the history of the IAEA when the agency had acknowledged that its safeguard system was insufficient to guarantee detection of any diversion of fuel rods. The then director-general admitted this before the IAEA board of governors in 1981.

A word about the limitations of the IAEA safeguards is relevant here. In the case of Israeli attack on the Iraqi reactor last year the IAEA had declared that it was fully statisfied with its inspection. However, the testimony before the U.S. Senate given by one of the agency's inspectors, Royer Richter, showed that even in the best of circumstances the agency safeguards suffered from serious deficiencies.

Surely when even in the most effective form the agency safeguards are not foolproof, then in those instances, like in Pakistan, where the agency itself admits to the inspection arrangement being inadequate, it will be imprudent to ascribe to the safeguards system greater effectiveness than it really has.

The story of the Pakistani nuclear programme as narrated by the late Mr. Bhutto, makes a pertinent revelation in this context. To quote his words "now we have the brain power, we have the nuclear power plant at Karachi. All we needed was the nuclear reprocessing plant. Arrangements for the heavy water, the uranium and the fuel fabricating plant had been made. We were on the threshold of full nuclear capability, when I left the government . . ." The statement, coupled with the fact that the reprocessing plant which Mr. Bhutto talked about was the one being given by the French in 1977 (under full safeguards), shows that he had already made up his mind to break the safeguards at any appropriate time and make his Islamic bomb.

Since the present military government's efforts to make the bomb are not in doubt, how can one say with certainty that the international safeguards will be respected by Pakistan?

It can be argued that without breaking safeguards, Pakistan cannot accumulate enough fissile material to sustain a regular weapons programme. But that is not the issue. The issue is whether it will have enough material to make a couple of explosive devices. The period during which the IAEA inspectors were handicapped, amounts to three months. During this period enough fuel bundles could have been substituted, to permit extraction of adequate plutonium for a couple of devices.

Pakistan has been running its reactor at low burn up. One excuse for the low burn up was that after 1976 when Canada withdrew its cooperation, regular and adequate fuel supply was not assured. But the reactor has always been run at low burn up. This was the case before the Canadians stopped their supply and continues to be the position even now after Pakistan has achieved fuel fabrication capability. One cannot be sure that this capability was not achieved earlier than the date on which Pakistan openly acknowledged it and that the fuel rods were not being frequently changed to get irradiated rods with acceptable plutonium 240 content.

Misleading Campaign

Then there is a flourishing black market in fissile material, as the *International Herald Tribune*, has elaborately reported, quoting chapter and verse.

One has to be somewhat wary about the disinformation campaign by vested interests, especially highly-placed western sources. As pointed out earlier, the entire campaign about reactor grade material leading to weapon capability was misleading but was launched to foster western interests. Now the attempt is to play down the Pakistani capability and hence all kinds of arrangements are being put forward.

When the U.S. had bad relations with China, that country constituted a grave threat to world peace. But after the Sino-U.S. rapprochement China is considered a benign power with no aggressive design or capability! It is therefore essential that we do not accept encapsulated assessments of others in regard to Pakistan's nuclear capability but do our own homework and reach our own conclusions.

CSO: 5100/7111

CASTRO MADERO'S NUCLEAR SUBMARINE PROPOSAL APPLAUDED

Bahia Blanca LA NUEVA PROVINCIA in Spanish 19 Jun 82 p 2

[Editorial]

[Text] Adm (R) Carlos Castro Madero, the chairman of the CNEA [National Atomic Energy Commission], recently returned from the latest IAEA [International Atomic Energy Agency] board of governors meeting in Vienna, at which he represented Argentina. Upon his return he spoke of some aspects of Argentina's energy policy, particularly its eventual capability of having nuclear weapons, in light of Argentina's present situation.

It is being made quite clear with the war in the South Atlantic that Argentina needs a military industry to give it a real deterrent capability. In international relations, this capability is equivalent to the ability to negotiate. There can be no doubt that Argentina might have had a different result if it had an independent, private, efficient, and creative arms industry--not Military Productions, which should be abolished as soon as possible--but rather, an industry like the one that Admiral Castro Madero has been proposing for quite some time now, both implicitly and explicitly.

In his comments on the nuclear energy development program, the CNEA official said quite positively that "if the national executive decides to do it, it can be done," in reference to the possibility of Argentina building a nuclear submarine.

While everything related to the development of nuclear energy in Argentina is always of the highest importance, given our present circumstances, the interest of observers is naturally focussed on the technological option discussed by Admiral Castro Madero.

As this editorial is not, and does not pretend to be addressed to military specialists, we will assume that the advantages of having a nuclear submarine in the navy are such and are so great that they could turn around the outcome of a military confrontation. The use of this sophisticated technology has become a tool for a nation's independence, a factor, and one which may be decisive, in the event in which a national intention must find expression through the always eloquent voice of arms.

In his comments, Admiral Castro Madero warned of the danger caused by those countries which in practice do not comply with the provisions of the treaties they have signed to prevent nuclear proliferation. By ignoring these commitments, they create or deepen the distance between the industrialized countries and those which are still developing their use of nuclear energy. Consequently, they aggravate the differences in terms of military capability. No one can fail to see that in this way they accentuate the system of dependence that is applied so strictly in the spirit of Yalta.

The sustained and consistent policy--possibly Argentina's only such policy in recent decades--with which Argentina has dealt with the problem of nuclear energy, making it pivotal in its industrial development, and also in its foreign policy, is related to its international commitments, as we find in the words of the CNEA chairman. "Argentina," said Admiral Castro Madero, "has supported in good faith the policy of nonproliferation." This policy was contained in the Treaty of Tlatelolco for the Latin American countries and in the TNP [Nuclear Nonproliferation Treaty] for the other countries of the world.

But in reality, it must be clear to everyone that the TNP, which Argentina rejected emphatically in 1978, is nothing more than an instrument of the great powers, members of the Club of London, to prevent or make difficult the use of atomic energy for nonpeaceful purposes, thus to some extent ensuring that they will maintain their monopoly on its use. This is a way of protecting the supremacy they have attained in the use and management of this technology which is, as no other technology can be, a factor and determinant of sovereignty.

The fact that a scientist of the stature of Admiral Castro Madero is proposing and actually strongly advocating the use of this technology for definitely nonpeaceful purposes is a sign of maturity. The hour of truth has now sounded for Argentina; this is a moment for realism. Our experience in the South Atlantic has shown us the harsh and unadorned face of international reality, and we must heed this reality. Now it is not a matter of a scientific possibility, but rather a political decision which must be made. Our top official in this field has stated this so clearly that there can not be two interpretations. We can have a nuclear submarine; we must just make the decision to do so. And in the present state of affairs, there is truly only one option left.

7679
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WRITER FOCUSES ON RAPID DEVELOPMENT OF NUCLEAR INDUSTRY

Buenos Aires CONVICCION in Spanish 6 Jun 82 pp III-IV Economic Supplement

[Article by German E. Anton: "The Argentine Nuclear Industry--A Sector Where the State and Private Enterprise Converge"]

[Excerpts] If there is a national institution that mobilizes the fantasies of power residing in the collective Argentine sentiment, covering the entire ideological and social gamut, it is the National Atomic Energy Commission (CNEA). Contradicting those who suppose that the national spirit is dominated by utilitarianism, the collective image of the CNEA has no utilitarian connotation, despite the fact that the nuclear industry is one of the economic sectors with the most dynamic growth at the international level and doubtless will be one of the most important economic sectors during the next century. Its growth will be the inevitable consequence of the exhaustion of conventional energy sources and of the profound technological changes in the use and distribution of electric energy that will occur in the next 20 years.

The entrance of the nuclear industry into the era of fusion reactors will imply the start of a stage of rapid growth in this sector. For civilization this will mean the opening of an era of limitless energy availability at nearly constant cost. But the nations not possessing nuclear autonomy by that time will be the black sheep of scientific civilization.

Inevitably Argentina is one of the developing countries making the greatest progress in that direction.

Referring to the Nuclear Plan, Vice Admiral Carlos Castro Madero has stated that "this instrument allows the country to achieve self-sufficiency in the nuclear field.... This objective, which I always define as long-range, but which helps orient all CNEA activities, cannot be achieved by its action alone, but on the contrary, it requires the participation of all of the sectors of national affairs with the capacity for it, in particular to two very important sectors: industry, as the source of components, and national engineering, as the source of know-how, the intelligence for taking those components and making a system."

This Nuclear Plan, in addition to building a series of power plants that were not contracted for key-in-hand, but under a system permitting a process of technological transfer to national engineering and industry and that involves taking responsibility for the project and managing power plant construction, foresees completing the named full cycle. That is, build not just power plants, but all elements consumed in their operation.

This cycle includes uranium enrichment and the construction of fuel elements, reprocessing of burned fuel in order to obtain new fuel, construction of components and the fabrication of heavy water, which is not a fuel but a component of the nuclear power plant system.

The policy drawn up in the Nuclear Plan is not new, but continues the overall orientation maintained throughout the 30 years of its existence. In 1973, when it was decided to continue to use natural uranium reactors, it was sought to continue an independent development that could free the country from the obligation to buy fuel in the United States, since the technology of enriched uranium is beyond our reach due to its complexity.

We can say that the nuclear industry is basically an energy industry. In this framework there is no doubt that in the next 2 decades Argentina's priority will be in the development of the gas transport infrastructure and its corresponding thermal generating capacity. This policy ought to be the result of the enormous reserves recenly located. Despite the foregoing, hydroelectric energy projects will play a predominant role in the futvre, principally in multiple uses, especially in the development of fluvial transportation routes, in improving the ecological conditions of vast zones and in the introduction of irrigation to hundreds of thousands of hectares, where it will be possible to practice intensive agriculture.

Nuclear energy will begin to play its true role after the possibilities for hydraulic generation have been exhausted and gas consumption has stabilized. But for this future the country will need to fully control nuclear technology, because otherwise it will be unable to enter the nuclear era. Or it will have to pay a very high economic and political price. The basis of the Argentine Nuclear Plan is in the development of our deposits of nuclear minerals that are to feed our future atomic factories. In this regard, reasonably secure reserves for 30,050 tons of U_3O_8 have already been established, exploited at a cost of less than $100 per pound, and sufficient to meet the fuel needs of eight power plants of 800 megawatts each over 30 years, that is, during their useful life.

Private participation in the mining activities of exploration has reached an important level. Prominent in the group of mining subcontractors is the consortium Conevial-Babic-Codi. The bidding on the exploitation of the Sierra Pintada deposit was frustrated on account of the disappearance of the enterprise Sasetru, but a new bidding process is now under way.

The mineral is concentrated in three plants: that of Malargue, that of Don Otto and that of San Rafael, with a total capacity of 143 tons a year. The stage of converting and evaporating the mineral concentrate, which was being carried out in Germany, will begin to be developed in the new plant acquired from the German enterprise RBU. Construction was finished early this year and as foreseen operations will begin during the coming months.

Also successful was the development of a specific technological process for conversion, evaporation and concentrate that will be assisted by the corresponding patent and that will integrate the national course of uranium dioxide production.

The enterprise group Perez Companc has recently joined the nuclear industry by putting into operation the fabricating plant for fuel elements: it acts as a CNEA partner, holding 66 percent of the capital in Conuar SA, which will manufacture the machined components in zircaloy alloy and the tablets constituting the fuel elements of the nuclear power plants.

The Pilcaniyeu plant in Rio Negro will produce metallic zirconium to be supplied either through local minerals or imports, and the Ezeiza industrial-scale smelting plant will produce the zircaloy ingots at the rate of one per month. These ingots to go by way of Acindar because they do not justify a specific installation.

As part of the bidding process for the Atucha II power plant now under construction, with more than 10 percent of the civil works completed, a heavy-water plant was contracted with the Swiss company Sulzer. This plant is now 33 percent complete, and it is expected that it will be in operation at the beginning of 1984.

Meanwhile, a pilot plan for heavy water now under construction on the property of Atucha I is 60 percent complete. There Arroyito personnel will be trained and research will be organized.

But possibly the most significant development is in the technological field. As a result of the misfortune suffered by the Canadian atomic energy entity in constructing the Embalse plant, the CNEA has taken over the project management, an engineering capacity that will later be transferred to Enace, an engineering society for the planning and construction of Atucha II and comprised 75 percent by CNEA and 25 percent by the German KWU. Now acting as subcontractors of this enterprise in developing the mentioned power plant's engineering are two private enterprises with local capital: nuclear SA under Admiral Oscar Ruhillar, former chief of CNEA, and a consortium comprised of Techint, Tauro, Sade and Aragatom under Admiral Fitte and belonging to the Bridas group.

As far as possible the large components of Atucha II have been awarded to a local enterprise, Pescarmona SA, which set up the necessary infrastructure, including two steam generators, three coolant refrigerators and the pressurizer, all now under construction.

All this allows one to suppose that with the completion of Atucha II the country will have covered at least half of the way enroute to the goal of nuclear self-sufficiency.

"It is highly unlikely that developing countries with important nuclear programs will write out a blank check for safeguards such as the Nonproliferation Treaty and the full scope safeguards without the corresponding certainty of transfer of all technology, equipment and services by the supplying countries," stated Castro Madero in the 15th annual conference of the Japanese Atomic Forum, referring to the Argentine decision to develop nuclear fuel reprocessing, the possession of which would permit the country to construct an explosive nuclear device.

In fact, the corresponding plant is now 100 percent complete in planning and basic and detailed engineering, 80 percent of the civil works are complete, and work has begun on installing the electromagnetic equipment. It is expected that it will be put into service in August of this year.

Nevertheless, the firm national position on acquiring nuclear self-sufficiency should not be confused with a warlike policy. In spite of being fully capable of constructing an explosive device whose possession would become a disintegrating factor in the Latin American community of nations, Argentina has decided to continue its policy of regional nuclear cooperation already begun by providing Peru with an experimental reactor and through a new agreement for technical and scientific cooperation with Colombia that very probably will also include a reactor and the necessary training in operating it. The reactor similar to the one provided to Peru will be of the pool type, will have an initial force of 3 megawatts, will use uranium with a low level of enrichment and light water as a coolant. The offer, which is competing with others coming from developed countries, has already been approved by that country's Nuclear Affairs Institute.

In this way, on its own account the country appears as a future exporter of technology, power plants, nuclear supply and fuel, claiming for itself in specific terms a policy of peaceable nuclear development.

9746
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PRIVATE SECTOR REPRESENTATIVES DISCUSS NUCLEAR DEVELOPMENT

Buenos Aires ENERGEIA in Spanish No 25, Jun 82 pp 588-593

[Round table discussion, held on the anniversary of the creation of the CNEA, with representatives of the private nuclear sector. Participants included: engineer Jose Maria Fumagalli of SOCMA, S.A.; engineer Luciano Valgiusti, commercial manager of ANSALDO Argentina, S.A.; engineer Gerardo Abelleyro, commercial director of IMPRESIT SIDECO; Rear Adm Raul A. Fitte, chairman of Argatom, S.A.; engineer I. Gurtensztein, vice president of TEYMA, S.A. and a representative of the ION consortium; Dr Raul Boix Amat, vice president of the Argentine Nuclear Technology Association; George Wiginton of Atomic Energy of Canada Ltd; and Luis A. Lara, the chairman of ZOLODA, S.A.]

[Text] ENERGEIA: The purpose of this meeting is to evaluate the development of the Argentine Nuclear Plan from the point of view of the private sector. To do so, we will have to remember the particular circumstances facing Argentina right now, and possibilities for the immediate future.

Abelleyro: Based on our experience in doing construction work for Argentina's nuclear power plants, we are taking part, along with a group of Argentine firms, in the programming established by the CNEA [National Atomic Energy Commission] for the construction of Nuclear Power Plant No IV. In reality, instead of programming for the new plant, we should actually say "ways to reach the programming phase." That would be more accurate.

As for the local prospects for nuclear energy, I would say they are good. In any event, this doesn't mean that we are ready to handle the complete construction of a prototype plant. Our present technological level lets us just handle a certain level, but we are confident that in the future new possibilities will open up for us as we continue to expand our technological capabilities.

Valgiusti: As a representative of ANSALDO of Italy--through ANSALDO Argentina--I have come to listen to the plans for Argentina's nuclear development. ANSALDO does have something to do with this development, through its participation in the Embalse del Rio III plant and through another firm in the ANSALDO group, which is doing some consulting work for the CNEA.

Furthermore, at the end of last year we signed a licensing contract with SIAM Electromechanics for electric rotary machinery. On the basis of this licensing arrangement, SIAM was able to take part in the ENACE bidding for Atucha II.

Gurtensztein: We are starting to work on everything related to Argentina's nuclear development. The firms in our group want to take part in the execution of a certain number of engineering projects. This interest was stimulated by the CNEA, which encouraged us--along with other companies--to take part in these important national plans.

About how we view the present time in terms of our nuclear development, I feel that our opinion generally coincides with that of other business representatives. The panorama that seems to be dominating the present is one of some uncertainty about the immediate future of atomic energy.

We do believe, though, that the slightly more distant future seems more promising. The country will not escape from the laws of nuclear development, just as it could not avoid thermal or hydroelectric development. About the immediate future, we feel that some of the existing doubts should be cleared up. We know that there are circumstances preventing this right now, but it would be good if some precise information about the plan could be released as soon as that is possible.

ENERGEIA: What do you mean when you say that the immediate future seems a little uncertain?

Gurtensztein: We feel that there is some uncertainty because we don't see any definitions in the nuclear area. We are familiar with the Energy Plan, of which the Nuclear Plan forms a part, and we were relying on its objectives and terms. But in view of the delays in the entire plan, we are wondering if these delays may also affect the Nuclear Plan, and if so, to what extent.

Lara: Our expectations for nuclear power plants are down at the moment after the completion of the work for the second plant under construction.

We agree with the preceding views, because we believe that Argentine industry will be less involved in manufacturing components for the Atucha II plant.

Right now we are waiting for the CNEA's decision before we tackle the feasibility study for the construction of plant no IV. This project, headed by Captain Leibovich, opens up great prospects for all Argentine businessmen because it suggests a greater participation by our private sector than in previous projects.

Boix Amat: You know that the Argentine Nuclear Technology Association, which draws together scientists, engineers, and other specialized professionals, along with a group of local businessmen working in the nuclear field, is able to evaluate the present situation with some degree of independent judgment.

In our opinion, speaking in general terms, there is a deep concern about the possibilities for work in the short term. While we don't ignore the fact that this is the result of an economic situation that affects all activities, and not just the nuclear sector, this sector is particularly sensitive to breaks in the continuity of demand. This is so because, in order to do any work in the nuclear field, the businesses involved have had to make some infrastructure investments, which must still be paid off.

We do know that the government, and particularly the CNEA, is aware of this situation and is making great efforts to keep the Argentine Nuclear Plan on schedule. We sincerely believe that this plan is one of the most solid programs of the Argentine state, and we of course have made commitments to help to achieve its objectives.

Because of this, and also because of our confidence in an industrial recovery, our businesses are trying to maintain the structures they have managed to create so far, so that they will be able to respond to an increase in demand when better times come back.

ENERGEIA: In continuing our analysis of this issue, it would be of interest to find out your opinions on nuclear plant no IV that is now under study, and with this in mind, could you describe the industrial possibilities in both the short and midterm periods?

Abelleyro: The meetings we have had recently with the CNEA have been working on determining the existing industrial capacity in Argentina, so that it can be established what can be obtained in Argentina and what we would have to import. I should make it clear that the study is now just at the enunciation phase, that is, the jobs to be done have been listed, but no work has yet begun.

ENERGEIA: Do you think that the restrictions on obtaining technology from other countries will mean an indirect restriction on the participation of Argentine industry in plant no IV?

Lara: I think that the Rio III plant gave Argentine industry an opportunity to meet a such a challenge successfully. The challenge consists in providing components that were on the rejection lists which were submitted by Canada at that time.

So we are now evaluating everything that was done in terms of instrumentation and control, everything that was provided by our national industry, and even what we could have done but which, because of a lack of knowledge about the project, was obtained from foreign sources.

Based on that extremely valuable experience, today we can visualize the possibility of increasing the percentage of our participation, or what amounts to the same thing, cutting back on the percentage of imported components used.

At this time we could definitely increase our participation in terms of instrumentation and control over what was done for the Rio III plant. That is exactly what we are trying to do for the next plant, since the objective is to increase our share of the work with each succeeding plant.

Boix Amat: I would like to make it clear that the study on plant no IV has still not begun. This initiative arose from a concern expressed by Captain Leibovich some time ago. I remember that he asked the businessmen at a meeting held in the Faculty of Engineering to take action to evaluate the nuclear plan and the existing local capabilities.

At that time we were unable to develop any interbusiness coordination to respond to that proposal. He brought it up again later, while proposing a feasibility study for plant no IV, and asked the local businesses to prepare some proposals.

Of course, taking some actions has not been at all easy for our businesses. We have to remember that in Argentina there is no market for nuclear goods and services for the businesses to evaluate. At home they have only a single client for their services, and their expansion depends on what that client requires of them. For this reason, if the major companies are to take any initiative, their client must encourage them. That may be the reason why the businesses were unable to respond fully to that challenge. Nonethless, toward the end of last year, a number of proposals were submitted, which were not in complete harmony with each other, and which did show too high a level of individuality.

Because of that, the CNEA promoted the establishment of a number of interbusiness committees, which then prepared new study proposals, now being analyzed by the CNEA. I want to make this clear, because the studies for plant no IV have still not begun.

ENERGEIA: This would indicate that, to some extent at least, the problem still remains, since last year you made comments similar to what you have just said. At least about the fact that the existence of a single client keeps private enterprise from getting deeply involved in nuclear development programs.

Boix Amat: I do think that in this area, the situation is changing. From last year until the present we have made some progress, and I think that in our present circumstances there may arise some interesting possibilities in terms of a regional integration of the nuclear industry.

As you know, Argentina has had to submit, and still does, to severe restrictions on the acquisition of nuclear technology. For this reason, the CNEA, which had had to suffer the brunt of these restrictions, is now openly working on the nuclear development of some fraternal nations of Latin America.

As a result of this policy, we may expect a harmonious regional development leading to a true Latin American nuclear market, and if that does come about, the results may be surprising.

Let there be no doubt about it: the task of achieving any sort of complementation and integration of the nuclear industry in the region is not a simple one, because there are strong extra-regional interests opposing this, which are encouraging false expectations of hegemony, and stirring up old rivalries which should be forgotten.

The achievement of nuclear self-sufficiency on a regional basis is the goal of the newly established FANAL [Federation of Nuclear Associations of Latin America].

On another issue, and getting back to local topics, I do feel that we have not made progress on some proposals that have been around for several years.

For example, there is the effort by the AATN [Argentine Nuclear Technology Association] to get legislation promoting nuclear construction, industry, and engineering, a law to stimulate the necessary private investment and growth in this sector. In this area I have to admit that we have not had any success, since such a law has not been promulgated. But I should also admit that the CNEA has tried to fill this void by means of a purchasing policy that encourages local activity.

ENERGEIA: But the possibility of legislation promoting the Argentine nuclear industry still seems distant?

Boix Amat: Yes, it still is.

ENERGEIA: Do you feel that there are definite possibilities that the Argentine nuclear industry could really expand its activities in Latin America and by that means achieve a certain level of regional integration?

Boix Amat: I think so, especially in Brazil and Mexico. In these two countries, just as in Argentina, there is a clear understanding of the magnitude of the effort involved in achieving local self-sufficiency in the nuclear field. Very large investments are needed for total independence, and the local market can not afford these investments. For this reason some form of complementation and integration of the nuclear industry on a regional level is considered necessary, along with the joint defense of the regional market. Personally, I believe that this is the most sensible way for the businesses in the region to achieve levels of technology and quality that will put them in a good position in terms of international competition.

Fitte: There is an interesting potential market in the area of training professionals on nuclear issues. The countries are interested in training people and so they need people with the experience and knowledge which we are in a position to provide. It is a different matter if we are talking in terms of industry, in terms of being able to produce reactors. In that area opinions are somewhat divided. There are some people who maintain that the country's capital should be put into other areas, and money should be spent only on research and training in nuclear energy.

We have done some work in Peru and we intend to do some in Mexico. We are finding that this is feasible because of the ready acceptance that Argentina has.

In my opinion, this is due to our country's nuclear policy and I feel that this is the most transferrable thing we have to offer. It could be said that Argentina "has crossed the Rubicon" with its nuclear program, and many countries in the region want to imitate our example, which we have created by means of our policy.

For that reason, there are a number of Latin American nations that are eager to follow Argentina's leadership in nuclear matters.

ENERGEIA: Do you think that the political aspect is the only thing that may attract the interest of the Latin American countries toward Argentina?

Fitte: For the moment, I think it's the best thing we have to offer. The other issue is certainly investments.

The question may arise: who will take the big step of providing capital to produce power reactors? I feel that this is a more difficult matter, because the countries which do have economic possibilities may also have coal or hydroelectric resources, and may use their capital for development there. So there may be differences on this topic, but where I do believe that there is great uniformity is their acceptance of Argentine leadership in nuclear energy matters.

ENERGEIA: Do you believe that these countries, the majority of which signed the Nuclear Nonproliferation Treaty, might revise their policy in view of the political change in the region?

Fitte: I believe that the meaning of nonproliferation is not limited solely to nuclear weapons, but that it covers a broader concept--the capability and knowledge needed to produce nuclear energy. In my opinion, that is the essence of what the Treaty seeks to accomplish, for it is quite clear that a country that can conduct a peaceful nuclear energy program also has the potential capability to produce nuclear weapons.

For this reason, there has been an attempt to use the Treaty to block access to knowledge of nuclear topics. This is a very particular and very discriminatory solution, of course. But it doesn't stop the countries which signed the Treaty from trying to develop their nuclear capability, and so they see in Argentina an example that they can follow to develop an independent nuclear program.

ENERGEIA: Might we think that the new Latin American policy, developing after the Falklands conflict, could have as its pivot nuclear issues?

Fitte: I don't know if I would call it a "pivot," since each country will have to evaluate factors related to its national interest and to the suitability of using its economic resources for such a program. But everyone is aware of the need for training in nuclear energy.

ENERGEIA: What might be the role for the Argentine private sector in such a process?

Fitte: I feel that in a process like this we should not speak in terms of "private sector" and "state sector" but in terms of the nation. I feel that we are capable of taking the best possibilities from both sectors.

I think that if we--representatives of the private sector--tried to guide policy in the nuclear sector, we would not get the best results. In a similar way, when the state gets involved in aspects beyond its competence, it gets entangled in regulations, controls, etc., and then its function is distorted. So my understanding of what the state should do primarily includes planning policy for the sector, and directing research.

ENERGEIA: That means you are thinking of a mixed public-private sort of system for the sector?

Fitte: To make my meaning more clear, I think that a private firm such as Argatom can not take over responsibility for policy, research, and services. We have to take responsibility for what we really know how to do. That is to seek new markets, to develop commercial strategy, and improve the level of our services.

ENERGEIA: That's true, even though it seems that some sectors which deal with the fuel cycle believe that the state doesn't bring about any effective participation in this area.

Fitte: Yes, but still we do find a favorable change for our sector. I believe that we are moving toward greater participation, and we are maintaining a good dialogue with the CNEA. Both these things are highly positive.

Lara: I agree with these comments. I think that now there is more enthusiasm on the part of business. When Captain Leibovich tried to bring the businesses closer together to form a unifying and coherent moement, then the first steps were taken to do away with too much individualism. In the latest meetings some important agreements were reached, and now the major engineering and construction firms have expressed their desire to join forces to handle studies for nuclear projects.

Furthermore, we should not worry too much about competition between businesses. While it may seem that there is too much competition now, we have to remember that Argentina is going through a very widespread depression, and this brings in companies which have little or nothing to do with nuclear energy. I have confidence that when we have an industrial recovery, these companies will go back to their true fields of interest, and there won't be so many companies left in nuclear energy.

Fitte: About the competition which Mr Lara just mentioned, I would say that the AATN might be able to help in establishing some quality control. We aren't asking the CNEA to require a certain level of quality from us. We will do this through the association of which we are members. We should demand a certain level of quality in the products we create, which could be done by a form of self control within the private sector. That would help to keep out fly-by-night operators.

The sort of standard we would like should include different areas, such as safety, industrial quality, engineering capability and knowledge, and even a demonstration of financial and economic capacity. That would help to weed out some companies, and then those that are left would be the ones that could really work in this sector.

Lara: Another idea that I feel would be of use would be to increase the volume of state purchases and not let the cost of technology fall solely on large projects, such as nuclear and naval projects. In a word, we should try to distribute the cost of infrastructure so that it will not depend on a single project. I feel that the state does have a sufficient purchasing power to do this, through the application of a true quality control program. That would help the private sector toward a more rapid development, both internally and externally.

Gurtensztein: I would like to add that the market for nuclear construction is not large enough in Argentina for us to allow ourselves the luxury of not permitting the participation of a number of companies. In that way we might reach the extreme of "all or nothing." On the contrary, I believe that such competition is essential. We have to remember that opportunities for participation do not come all at the same time, but rather in succession. Therefore, the opportunities provided by the Nuclear Plan do not allow businesses to choose one or the other possibility.

In summary: the way to move the Nuclear Plan forward, in terms of participation by the private sector, is through close cooperation within the private sector.

ENERGEIA: What specific possibilities do you see for the technical qualification of our businesses in the Latin American market, and what amount of willingness is there in businesses in the region to join forces with us to work on joint projects?

Fitte: The prospects are good, both in nuclear projects and in others. There is a good opinion of the level of quality of our services, and I believe that the possibilities are even better if we propose Argentine participation in terms of complementation.

Furthermore, the excellent quality of our professionals is also recognized, and the fact that we have good intermediate level people as well. The United States, for example, has good engineers, but then they drop down to the level of equipment operators. In Colombia this situation was found, since businesses could not build new projects because of a lack of mid-level people to handle them.

Fumagalli: That problem also arises in business. For example, in Venezuela there are large construction companies, but no medium-size companies to handle smaller projects. So I think that both medium-size businesses and mid-level technology would have great opportunities in Latin America.

ENERGEIA: Mr Gurtensztein was speaking of the complementation of businesses within the Argentine market. How do you view the possibilities for Argentine service firms to move outside Argentina to obtain new markets?

Gurtensztein: My view is that "outside" for us means Latin America. I don't see many possibilities for our companies in other parts of the world because of the great competition in other regions.

But in Latin America, there are greater opportunities, and in this respect I should mention that in a number of countries in the region there are service companies that began in Argentina. Some of these companies--actually subsidiaries--are now larger than their parent organizations because of the characteristics of the market they operate in. So I don't see any problem for our companies involved in nuclear energy in expanding into the region, especially if we remember the relative advantage these companies have in terms of experience and knowledge of the field.

ENERGEIA: We have considered at some length the issue of businesses involved in engineering. Now it might be of interest to consider companies which provide services. It would be useful if we could define those electromechanical and electrical sectors in which Argentina could reach the most rapid development and thus the greatest amount of participation in providing equipment for future power plants.

Lara: Our companies have still not done much in electronics, but there is a great amount of interest in taking a more active part in that market. We should point out, though, that there is a quantitative factor involved here--the level of demand for equipment. The problem is rooted in the very large investments in machinery, equipment, tools and dies, etc. that must be made. If demand is not large enough, these investments can not be justified, at least in the short term. So the study to be done should clearly show what equipment we can produce most economically here.

ENERGEIA: Is the reactor to be developed a new model of CANDU or is it similar to the existing reactor with just a few modifications?

Boix Amat: I could comment on the scope of the proposal that the Engineering Business Committee has prepared, which to a certain extent encompasses the work of the other committees. This proposal distinguishes various phases in the study of plant no IV.

The first of these is simply an analysis of the Embalse Power Plant, in terms of the possibility of reproducing it exactly with the maximum amount of national participation. While this is a somewhat theoretical exercise, since no two power plants are exactly identical, it will tell us exactly what we can do locally, and what goods or services we will have to acquire abroad.

The participation of local companies in this study is unprecedented, because until now these matters have always been worked out with the foreign supplier, who naturally has some interest in the issue.

In the following phases of the study there are plans to analyze the modifications in terms of site, safety and physical defense, new licensing requirements, etc., until, working through successive phases, we reach the preliminary power plant design, with a complete definition of the origin of the supplies required.

In the final phase, there will be an analysis of the investment required for this preliminary design in terms of the objective of self-sufficiency, and there will be an attempt to distinguish, for the various components and services to be provided locally, their production cost and the cost of the infrastructure that must be developed so they can be produced here.

The importance and the unusual nature of these studies lies in the fact that they represent a positive and radical change in the way in which nuclear plants will be contracted. In the past, this was done by purchasing the plant on the basis of a foreign proposal, and whatever the supplier accepted of local origin, without decreasing the guarantees provided, would then be deducted.

ENERGEIA: A concern that has come up on more than one occasion is whether the delay caused by doing studies of this nature may not cause us to fall farther behind the world level of development of nuclear reactors.

Boix Amat: It is true that there is a risk of falling somewhat behind, but we have to realize that changes in nuclear reactors are not really very frequent or very revolutionary in nature. The changes in recent years have mostly been made for safety reasons, and have been imposed on industry, and not generated by the manufacturers.

ENERGEIA: Our question didn't concern just changes made for safety reasons, but rather changes of a technological nature, such as fast breeders.

Boix Amat: Our studies are constantly considering our national goal of either local or regional independence. There is still not enough commercial and operating experience with fast breeers, and it is hard to think that we might be able to handle that technology in Argentina now, when we still have not completely mastered the technology for thermal reactors. Furthermore, the fast breeder reactors do require for their operation a certain number of thermal reactors operating in the system, so it would be hard for them to be installed here before the end of this century. And not being in the vanguard of nuclear technology could actually be a big advantage for Argentina, as it means we are traveling a road that has already been tried and proven. And so it is less risky.

ENERGEIA: As a conclusion, could each of you give your opinion about what has been said at this round table?

Abelleyro: My conclusion is that we in the engineering industry and in nuclear-related services are still somewhat separated.

This makes it harder for us to develop our own nuclear power plant. We have the desire to do so, but we still have not found the way to work together.

Valgiusti: My impression is that through the development of local technology, prospects of interest will be opened up for business, not only to meet internal demands, but also to handle the nuclear market in Latin America.

Fitte: My opinion is that we have made progress in terms of the competition that has developed recently, which has helped us to get ourselves in order and improve our quality. This is a sign of maturity which augures well for our nuclear industry and also for our entire national industry.

Gurtensztein: I feel that essentially we have not heard many dissident opinions here. On the contrary, I think that there is great agreement about the eagerness to work. As to "how" to do it, we are finding that businesses are prepared to work together in order to play a major role in our Nuclear Plan.

We should say that whoever is responsible for this plan should establish schedules in terms of time periods and priorities so that the businesses in this sector can restructure themselves to meet these requirements.

Lara: There is no doubt that there is agreement about major issues, and I am pleased to see that the businesses are quite prepared to work together. I see that the big companies are prepared to make room for smaller firms so they can work together to achieve the objective we all share: to build plant no IV with a greater participation by Argentine industry.

Boix Amat: I agree with what has been said. Just as in recent days our common enemy in the Falklands has brought about a true union of all the Argentine people, this other enemy, the recession, is bringing businesses closer together, as they want to survive and so are seeking greater cooperation and efficiency in the use of their resources.

Wiginton: I see that everyone has expressed, in one way or another, the idea that Argentina should export its technology to other countries of Latin America.

Canada has had something to do with the stage of nuclear development which Argentine has achieved, and so we would take pride in participating in the development of new markets, based on the capability which you definitely possess and have demonstrated.

I would like to add one more comment. Last week we were talking with members of the CNEA staff about the CANDU reactors and other reactors as well. At these meetings we discussed the possible development by Canada and Argentina of future fuel cycles. It is of some interest to note that Argentina is moving in the same direction as Canada in research on future fuel cycles. We believe that up to a foreseeable point in the future, for about 50 years or so, the CANDU will be a viable reactor, needing only some moderate changes because of differences resulting from the fuel used.

If this happens, we will have to make changes in some equipment, but the reactor itself will not be changed. Aside from all this, we should say that the CANDU reactor is proving--both in theory and in practice--that it is operating well and it is interesting to find that the CNEA has reached the same conclusions that we have about it.

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ECONOMIC SITUATION TO CAUSE DELAYS IN NUCLEAR PROJECTS

Buenos Aires ENERGEIA in Spanish No 25, Jun 82 pp 596-597

[Article by Martin F. Yriart]

[Text] Even before 2 April, sources close to Argentina's nuclear sector were speculating about the possible consequences of the budget cuts announced by the minister of the economy, Roberto T. Alemann, in an attempt to compensate for the state's financial difficulties.

Even while rejecting any defeatist sort of mentality, we have to recognize that the reordering of priorities caused by the Malvinas conflict--along with the halt in trade with some European countries and with members of the British Commonwealth--will certainly aggravate the effects of this already existing situation.

In the days before the conflict broke out, there was already public talk about new schedules for projects and in one case, it was suggested that contracts might have to be renegotiated. This prospect, now a certainly, raises a variety of questions.

The most immediate is certainly what will be the real delay in the projects affected, and what will the cost of this renegotiation be. There will certainly be a cost, since the state and the suppliers of the main projects have already obtained funding on the international financial market, and they will now have to pay the fines, interest charges and fees for not using these funds. As the time of execution of the projects gets longer, the preoperational cost rises.

Furthermore, the investment cost per megawatt of power in nuclear power plants has grown at a staggering rate in recent years. In Atucha I, this cost was about $.5 million. The initial estimate for Embalse, less than 10 years later, came to $1 million, while in reality the cost will probably be twice that amount. Then in Atucha II the cost will be over $2 million per megawatt of net power. Based on just the major projects contracted in recent years (Atucha II and Arroyito), contracts of the Nuclear Plan now being carried out are close to a cost of $2 billion. So we do have to wonder how much these delays which are being predicted are going to cost.

In addition to these budgetary considerations, which have an impact on the public sector, there are other concerns, whose impact is felt on the private sector. In this case we have to distinguish between the situation of large multinationals such as Siemens or Sulzer, which can spread out their risks over dozens of projects at the same time, and which are reasonably able to absorb temporary losses or to withstand an unexpected interrruption in their cash flow, and the situation of the companies which form Argentina's embryonic nuclear sector.

One of the objectives of the Nuclear Plan was precisely to create some continuity over time to provide these companies a steady demand, that would enable them to pay off their investments for materials and equipment, and to keep their professional and technical staffs.

A significant delay in the Nuclear Plan would be hard for these companies to compensate for in any effective way--especially the service companies--by looking for other markets, since in Argentina the problems affecting the nuclear sector also affect the rest of industry, and outside of Argentina competition is very difficult.

It is to be expected that not all the companies involved will be able to withstand this upheaval, and some may only be able to do so by substantially reorienting their interests.

In any country in a wartime situation, there are some intrinsically weak or nonstrategic sectors of the economy which collapse. Others, even though they may be new or small, but which do have some priority in determining the nation's survival, grow and flourish. The final result-barring a catastrophe--is a vigorous and dynamic structure. The reorientation from the goals of a wartime economy to those of peacetime usually brings about vigorous expansion.

Here a third aspect (in addition to budget considerations and problems for the nuclear industry) comes into the picture; this is an aspect that can not be overlooked in Argentina's present situation. What will happen to our economy at the end of the Malvinas conflict? How will energy demand, which is now low, be affected?

Even before 2 April, there were signs that a recovery in industry, which in recent years has worked at 50 percent capacity, might lead to an energy shortage. While demand has not grown at the rates forecast by the plans prepared between 1977 and 1979, energy projects have not progressed as expected either. At the end of last year, it was estimated that the shortage might be about 700 megawatts, which could be partially alleviated by the use of turbogas power plants.

Of course, given the choice between venting this gas and using it to generate electricity, the second is the more rational option. But isn't natural gas too valuable to be burned? It should rather be converted into industrial products with higher value, such as fertilizers, plastics, synthetic fibers, etc. Aren't the priorities sensibly established in the National Energy Plan being altered?

In his speech on 31 May 1982--the National Day of Atomic Energy and the 32nd anniversary of the founding of the CNEA [National Atomic Energy Commission]--the chairman of the CNEA, Vice Admiral Carlos Castro Madero, made some important statements. He emphasized the necessity that despite the conflict, "the country must continue to move forward." He warned that "there will be economic and financial difficulties that will require severe measures to be resolved." He spoke of the political importance of the independence that has been attained through the "effective transfer of technology" from abroad, "the continued and careful training of human resources," and "the constant and growing advancement of national engineering and industry." And in closing he restated Argentina's intention to "honor freely assumed bilateral commitments" with more advanced countries which are continuing to work responsibly on Argentina's Nuclear Plan.

Argentina's present circumstances have not changed the importance of nuclear energy in our total energy panorama. The date of 1997 may now seem very far away, but when we realize that the time of execution of a nuclear power plant is about 10 years, and that after 1997, about two or three new power plants should begin operating in Argentina each year, it is clear that the future is drawing closer to us at a more rapid pace.

While we recognize the seriousness of the present situation, we must think of that future and be certain that the tools we will need to deal with it will be preserved in the midst of this state of emergency which we now have. These tools will be needed to win the peace, once the war is over, for without that "we will know the bitter taste of victory."

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CASTRO MADERO CITES NEED TO REVIEW NUCLEAR CONCEPTS

Buenos Aires ENERGEIA in Spanish No 25, Jun 82 pp 594-595

[Speech given by Vice Admiral Carlos Castro Madero, chairman of the National Atomic Energy Commission, at a ceremony commemorating the founding of the CNEA]

[Text] We are meeting here today to commemorate another anniversary of the founding of the CNEA [National Atomic Energy Commission]. This anniversary now finds us experiencing grave historic moments for our nation, and showing to the world the innate strength and courage of the Argentine people, which many of us have just begun to value at their true worth.

In this commemoration, in which all of us who are members of the CNEA take pride in the level of nuclear development which we have achieved, we also take part in spirit in the heroic actions of our soldiers, sailors, and aviators who are defending our sovereignty.

Despite the fact that Argentine lives are being sacrificed in the fighting to the south, I did not believe it right to postpone or cancel this ceremony because it should symbolize for us that the country is continuing its progress and that we shall continue to maintain our traditions, even in a context of austerity. At the CNEA, maintaining our traditions means renewing the commitment of all our staff to do our jobs with the maximum dedication and efficiency, which is the best contribution we can make to the effort our nation is making at this time.

As a result of the conflict, we expect that there will be economic and financial difficulties that will require severe measures if we are to overcome them. These measures wil have to be accompanied by the individual efforts of every member of the CNEA to reduce costs to the minimum compatible with the progress of our nuclear program in its fundamental aspects.

The present historic circumstances which the Argentine people are facing have created an appropriate moment to repeat our concept of sovereignty. Sovereignty is not an anachronistic concept, as many claim who want to weaken the weakest nations. Even in a world of growing interdependence, sovereignty is a living, dynamic, indivisible concept that combines with the nation's decision-making capability in determining the use of its intellectual and material resources, in accordance with the interests of the republic. The nuclear program is designed to meet this objective, and it is totally consistent with the defense of our territorial sovereignty.

At these ceremonies, we have always believed it appropriate to evaluate what has been done in the field of nuclear energy, the level of achievement of our goals, what remains to be done, our successes and our inevitable mistakes. The circumstances surrounding this anniversary today suggest that we should analyze the nuclear policy which Argentina has followed until the present, a policy that was clearly stated by the government in decree no 3183/77.

The objective of achieving nuclear independence led us to select the natural uranium process so that we would not make our fuel cycle dependent on the whims of other countries, such as those which are now opposing Argentina militarily, politically, and economically. Because we have continued to pursue this objective of self-sufficiency, today we can be certain that this aggression can not affect our supply of fuel elements for our nuclear power plants. This is a factor of great importance to our country, as it neutralizes an important weapon--the use of pressures to bend the will of a nation.

The policy of requiring that each piece of equipment we obtain from a foreign supplier be accompanied by an effective transfer of technology, combined with an ongoing and careful training of human resources, and the constant and growing promotion of national engineering and industry, have brought us to a level of sufficiency which limits the efficacy of any measures that might be applied in the nuclear field in an attempt to put pressure on Argentina.

The decision to diversify the source of our supplies and to spread out our purchasing power among a number of countries when buying the major components of our nuclear program, even if it meant we had to pay higher prices, has put us in a much better position, one quite different from what it would have been if we had let outselves be controled by a virtual supply monopoly.

Today we can see that our policy of broad cooperation in the nuclear field with all the countries of our region without any hegemonic designs has been fully justified by the solidarity of Latin America during these crucial moments.

The same reasons have fully justified our role as a coordinator for nuclear issues within the nonaligned nations movement in which, apart from the political, social, and economic diversity of its members, there is ample room for the development of the peaceful uses of nuclear energy, for which Argentina is well prepared to contribute its scientific, technological, and industrial skills.

Argentina's decision not to sign the Nonproliferation Treaty which we considered discriminatory, and which offered no guarantees against the military use of nuclear energy by those countries with nuclear weapons against countries lacking them has been fully borne out by events, since the signing of this treaty would not have prevented the United Kingdom's use of nuclear submarines against our country.

The violation of the spirit of the Treaty of Tlatelolco which was accepted by the United Kingdom, a violation that was condoned by the other states which possess nuclear weapons which signed this treaty, confirms Argentina's doubts, which it has often raised in international forums about the sincerity of the nonproliferation intentions of the nuclear powers.

In summary, despite the fact that this conflict has shown the need for revising many positions and concepts, it does seem clear that our nuclear policy has been right for our national interests.

In the international press which serves the interests of the country which has used its nuclear submarines against us, and the interests of those who condone this action, we now find a growing realization that Argentina may use its nuclear capacity to begin a military development program.

Through our representatives in international forums, Argentina has made clear its support for the world effort to bring about nuclear disarmament and to avoid nuclear proliferation, both horizontal and vertical. But we have also made clear our decision not to bind ourselves by any type of neocolonialist treaty or agreements which would limit our freedom of action in the legitimate use of nuclear energy for the sole purpose of improving the health, wellbeing, and prosperity of our people and of those countries which want our experience and cooperation.

This policy is also supported by our objective of bringing about an authentic integration of Latin America, while strictly respecting national identities and with a just balance of interests.

Reality and the events in the south show that acting in harmony with the objectives of nonproliferation is more useful for world peace than merely signing treaties.

Many countries which signed such treaties enthusiastically and in good faith now feel cheated because of the systematic violations committed by the proponents of these treaties. Today nuclear energy is being used for military purposes against Argentina in open contradiction with a fundamental objective of the International Atomic Energy Agency, which supports the peaceful use of nuclear energy, and in violation of commitments which our direct aggressor made 15 years ago at Tlatelolco, and with the consent of the main advocate of nonproliferation in the western world.

In this ceremony, while reviewing our nuclear policy, I want very particularly to pay tribute to the employees of this organization, on whom all the capability of the CNEA is based. I also want to acknowledge all those who could not be with us today, and who have contributed their efforts toward the construction of a reality which future generations will appreciate and which, I am confident, they will perfect.

To you who are today receiving medals in honor of your long and productive years of service, I want to express to you our gratitude for your contribution to Argentina's nuclear development; this gratitude extends to your families as well, who have supported your daily work, which has so often kept you away from home.

Friends: The CNEA is a tool which can serve our national progress and help to assert our full and indivisible sovereignty which we all want, despite any difficulties it may entail. We must continue to respond by our actions to the confidence which the government and all sectors of our country have shown in us.

To our brothers throughout Latin America, we say that we will continue to respond loyally with our deeds to the confidence which you have in the CNEA. To all of those more advanced countries which are continuing to cooperate with us responsibly in the execution of our Nuclear Plan, we express our appreciation, along with the certainty that we will honor the bilateral commitments which we have freely made with them.

I pray that God will illuminate us so that we may always find the appropriate response for our national needs in the field of nuclear energy.

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INDUSTRIAL FIRMS FORM CONSORTIUM

Buenos Aires ENERGEIA in Spanish No 25, Jun 82 p 608

[Text] The firms ASTRA CAPSA, SDEM-TEYMA SA, and TEYMA SAICFA have agreed to establish the ION [Nuclear Engineering and Construction] consortium, making use of their operational structures, systems, and services.

Based on the objectives of Argentina's nuclear policy, of "favoring the development of national capabilities in design, planning, direction, construction, start of operation, and operation," and of "promoting a growing participation of national industry and engineering," and accepting the challenge this entails, ION will have the following objectives: the provision of engineering services, supplying of equipment and materials, construction and assembly, and assistance with the start of operation of nuclear power plants and/or their components.

These companies have a great deal of experience in engineering and services. ASTRA CAPSA has 66 years of experience with engineering, project coordination, and operation of its own plants. During the 1970s it decided to offer its services to third parties. The results have been highly satisfactory, both in terms of the level achieved in the projects executed, and in terms of the philosophy used in conventional projects, or in special projects such as the Experimental Heavy Water Model Plant, now being built in Atucha.

SDEM-TEYMA Hydraulic and Industrial Construction Company, S.A. is the result of the participation of SDEM [Research and Construction Company] and TEYMA [Abengoa Electrical and Mechanical Company]. SDEM is based in Grenoble, France, and since its establishment in 1917, it has been an active participant in France's energy development.

Special mention should be made of its participation, after a rigorous selection process, in the construction of the Super-Phenix power plant in Creys-Malville, France, and in the EURODIF uranium enrichment plant.

TEYMA is an electromechanical construction company associated with Abengoa S.A. of Spain, which also provides technical and economic backing. Originally TEYMA was oriented toward electrical and instrumentation specialties, such as the installation of the Lujan de Cuyo distillery. It later extended its activities in Argentina and abroad to the field of power plants, and mechanical and hydraulic facilities for gas and petroleum.

TEYMA has executed and is now working on projects of large size and great importance. To mention just a few, these include the Salto Grande 500 KV lines, the automatic railway signalling system for Brazo Largo-Zarate and the combined cycle thermal power plant in Posadas, done for General Electric.

In order to back up the potential and activities of the new consortium, in particular cases in which outside consultation and possibly intervention may be needed, it will be able to call upon the assistance of a number of foreign firms with experience in nuclear activities.

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ARGENTINA

BRIEFS

URANIUM RESERVES--The amount of known uranium reserves in the south of the province has been significantly increased. In addition to the Sierra Pintada uranium reserves, new deposits were recently found in the mountainous area of San Rafael, during exploration and prospecting being conducted there through the CNEA [National Atomic Energy Commission]. According to information made available to the press, "the crews working in the area near San Rafael, which includes the entire area necessary for exploration and mining, have greatly aided the Commission's plans. When drilling and measurements were intensified, in accordance with contract specifications, new reserves were found, which will significantly increase the amount of extractable uranium, and will open up new and greater possibilities for the region." [Text] [Buenos Aires ENERGEIA in Spanish No 25, Jun 82 p 586] 7679

CSO: 5100/2203

BRIEFS

ATOMIC BOMB RUMOR DENIED--Rio de Janeiro, 10 Jul (TELAM)--Brazilian Navy Minister Adm Maximiano da Fonseca denied press reports that Brazilian military sectors are doing secret research to build an atomic bomb. Admiral Da Fonseca, whose statement was published today by the Rio de Janeiro newspaper JORNAL DO COMERCIO gave assurances that Brazil is not undertaking the manufacture of any kind of nuclear weapon. He said: "Nowadays it is very easy to build an atomic bomb because a good handbook will do, but at least I am not aware of any plan aimed at that goal." The minister then said that the Brazilian Navy is concerned over other more immediate problems, such as its reequipment which will enable it to fulfill its constitutional role. He also announced that the construction of five Corvettes and two conventional submarines, to be undertaken with considerable Brazilian participation, will be started next year. In turn, Navy Chief of Staff Adm Jose Albano de Aratanha said yesterday that Brazil is already able to manufacture its own atomic bomb although our country has no desire to do so. During a press conference after dedicating the navy's ammunition factory in the outskirts of this city, De Aratanha said that Brazil should have defensive weapons. He said: "We should develop laser beams and other advanced weaponry, not nuclear weapons." [Text] [PY102001 Buenos Aires TELAM in Spanish 1410 GMT 10 Jul 82]

CSO: 5100/2209

OFFICIAL EXPLANATION GIVEN BY ATOMIC ENERGY ORGANIZATION

Tehran ETTELA'AT in Persian 10 June 82 p 6

[Text] An answer to the report that was published in ETTELA'AT on 2 June 1982 entitled "Decision of the Revolution Council and the Cabinet concerning the Bushehr Atomic Reactors remains in force" was received from the Office of Guidance and Public Relations of the Atomic Energy Organization of Iran (AEOI) as follows:

A short answer to the detailed article in ETTELA'AT on 2 June 1982. Raising issues in the newspaper about the country's atomic energy, particularly about construction of atomic reactors, can be very useful and enlightening from several aspects, because our nation, like all the living, free nations of the world, will give its views for and against the use of atomic power. Guidance will come out of these opinions which will facilitate the decision-making of officials. This is particularly true if the decision-making officials are the final, true representatives of the people, meaning the Majlis representatives, who are the true arbiters of the slogan "neither Eastern nor Western." It is necessary to say here that if a newspaper gives information to the people which is mistaken, tampered with or distorted, this will doubtless persuade everyone to imagine that a benefit for a person or group is involved in this view.

The ETTELA'AT article mentioned did not avoid this characteristic, since it propounded the one-sided, slanted views of the reporter and the former AEOI head which more resembled a justification for actions taken than a responsible polling of opinion. The newspaper's reporter made remarks in that issue that we do not plan to answer because we believe that today is a day for work and not a day for newspaper wars. We suffice with mentioning the points below:

After the revolution's victory, the AEOI's most important duty was to properly deal with the enslaving, numerous agreements that had been signed by the traitor shah to atomically energize Iran. Fortunately, these agreements were cancelled one after the other through the persistent efforts of the organization's believing, revolutionary forces. (Cancellation of the agreement to construct reactors in Esfahan, Saveh, Karun and Bushehr,...)

Here we deem it necessary to give further explanations about the Bushehr reactor because the plan for this reactor went into the construction phase during the former regime, and by the time of the victory of the Iranian Islamic revolution, a very large portion of its construction and technical work had been completed.

Bushehr Reactor

A. Making a decision about the Bushehr reactor was difficult because in the contractor's view over 85 percent of Unit One of the reactor has been completed. Finally, after forming work groups and holding several discussion sessions, preliminary reports were presented on 3 June 1979. Relying on these reports, the temporary government issued an order to stop the project. Following that, over a year later on 16 July 1980, the Revolution Council confirmed the previous work stoppage.

Here it is necessary to mention several important points:

First of all, that approval gave the cease work order, and it makes clear how long the stoppage can remain in abeyance, and when the matter must be followed up. In the organization's view, since this decision was adopted by the Revolution Council, only the Majlis can re-examine it. We believe that the Majlis must intervene whenever the issue of atomic reactor construction is raised. God willing, this intervention will be a vanguard so that the delusion of 23,000 megawatts of electrical power (the traitor shah's program) will not be repeated.

B. By simply saying that we do not want atomic reactors, no immediate complications are created. However, are the report's writer and interviewee also prepared to answer for middle and long-term complications, or not? Several questions arise in this regard:

Were several of those who examined the status of the Bushehr reactor in 1979 informed on the scale of progress in its construction and technical work? Did several of the examining persons inspect the reactor during that time? Is it not necessary to clarify the status of these huge facilities after the passage of over three years?

This is because even if there is a one in a thousand chance of a future decision to continue construction of the reactor, damage has been done. The point must be noted here that following the thorough examination by the work groups in 1979, they emphatically advised of the necessity of making more extensive follow-up studies of the Bushehr reactor issue from the various angles of politics, economy, environment, fuel spools, and power transmission. However, as existing documents testify, these studies were lost in oblivion until six months ago, and no action whatsoever has taken place in this area. Fortunately, we can announce that after a two-year interval, these studies were begun six months ago by AEOI experts. God willing, these comprehensive studies will be presented to the government.

C. The report's writer, quoting the interviewee, produced the views of our martyr Dr 'Abbaspur as proof. The AEOI, relying on tapes and a report by martyr 'Abbaspur that it has in its hands, announces that this martyr was never in agreement with the perpetual stoppage of the atomic reactors. It is even necessary to inform the martyr-nourishing nation that martyr 'Abbaspur several times ordered Ministry of Power experts and professors at Industrial University to re-examine the studies done in 1979 which led to the stoppage of the Bushehr reactor. In order to provide further information, we offer two parts of martyr 'Abbaspur's views below:

"Naturally, the issues of nuclear sciences and technology, atomic energy and atomic research I are important I since it can be clearly seen that in the not-so-distant future, perhaps 20 years from now, atomic energy will be a determinative issue in the energy structure of that time. Naturally, despite the possession of rich fossil energy reserves and other energy sources, we should have skill and expertise in this field, in this fundamental pillar which will be determinative."

"Therefore it is natural that results and decisions are reached and policies are made regarding atomic energy. Therefore, we, this group of people involved in the past and at the present with atomic energy issues, who are now working in this science and have knowledge about it, who are involved in this science's methods and who can evaluate the country's welfare in relation to this portion of science and technology, should sit down and define a policy. Since it is probable that there are various opinions and they cannot come to a unified policy and goal, they can present a policy or several policies..."

The point raised here is whether martyr 'Abbaspur's point of view is that of the interviewee? Or did he protect himself by the reverence in which the name of our martyred brother is held? (AEOI employees do not remember much parallel between the interviewee's views and the martyr's).

God willing, in the week of July which is the anniversary of the martyrdom of our martyred brother Dr 'Abbaspur, we will publish with God's help, for the information of Iran's noble nation, a full text of his speech concerning atomic energy.

In conclusion, it must be pointed out that the above explanations make it clear that one must refrain from the yellow journalism of a newspaper belonging to rejected political organizations before gathering exact technical and scientific information. This is because we believe that public opinion should be guided towards realism. Without doubt this kind of politics will muddy the water and narrow the range of opinion. However, one cannot keep the water muddied forever. In conclusion, we once again announce that decision-making concerning the Bushehr reactor is one of the definite rights of the Majlis, and we hope that preparations for this decision-making are made as soon as possible.

Office of Guidance and Public Relations of the Atomic Energy Organization of Iran

9597
5100/5304

NUCLEAR COORDINATING CORPORATION BEING LEGISLATED

Capetown DIE BURGER in Afrikaans 2 Jun 82 p 5

[Text] A central corporative institution for effectively coordinating and controlling all nuclear activities in the country is being created in accordance with the draft legislation on nuclear energy which was submitted for a second reading in Parliament yesterday by the minister for mineral and energy affairs, Mr F. W. de Klerk.

Mr De Klerk said that in practice this means that the two existing institutions, the Atomic Energy Board and the Uranium Enrichment Corporation, will be converted into companies and function as branches of the new corporation.

In addition the draft legislation provides for the establishment of a Council for Nuclear Safety which could function independently of the promotive functions of the corporation and its branches and could advise the government on matters of nuclear safety and licensing.

The new corporation will be a governing one and will dedicate itself to production and applied research and development. As far as possible basic research will be performed by universities and other organizations.

Mr De Klerk said that the restructuring of the nuclear activities in the country will consequently add provisions to the draft legislation for the repeal of the laws on nuclear power, uranium enrichment, and nuclear installations (licensing and security).

The minister also paid homage to Dr Ampie Roux, father of the nuclear research and development program in the country. He said that he wishes Dr Roux a well-deserved rest.

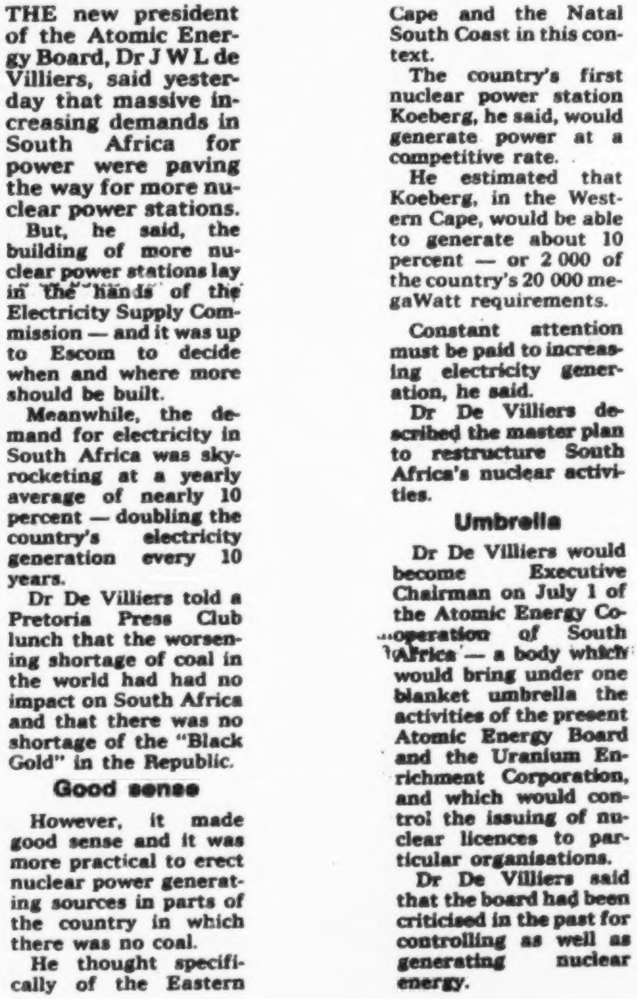
Mr John Malcomess (Progressive Federal Party for Port Elizabeth Central) said that the Progressive Federal Party supports the legislation in view of the fact that this is an improvement in the existing situation. However, he wants to know whether the country is going to expand its nuclear activities and whether the money which is now being budgeted for this is not too much.

He proposed that university experts and someone from the Cape's city council should serve in the proposed Council for Nuclear Safety.
7964
CSO: 5100/5670

PLEA FOR ADDITIONAL NUCLEAR PLANTS

Johannesburg THE CITIZEN in English 29 Jun 82 p 5

[Text]



THE new president of the Atomic Energy Board, Dr J W L de Villiers, said yesterday that massive increasing demands in South Africa for power were paving the way for more nuclear power stations.

But, he said, the building of more nuclear power stations lay in the hands of the Electricity Supply Commission — and it was up to Escom to decide when and where more should be built.

Meanwhile, the demand for electricity in South Africa was skyrocketing at a yearly average of nearly 10 percent — doubling the country's electricity generation every 10 years.

Dr De Villiers told a Pretoria Press Club lunch that the worsening shortage of coal in the world had had no impact on South Africa and that there was no shortage of the "Black Gold" in the Republic.

Good sense

However, it made good sense and it was more practical to erect nuclear power generating sources in parts of the country in which there was no coal.

He thought specifically of the Eastern Cape and the Natal South Coast in this context.

The country's first nuclear power station Koeberg, he said, would generate power at a competitive rate.

He estimated that Koeberg, in the Western Cape, would be able to generate about 10 percent — or 2 000 of the country's 20 000 megaWatt requirements.

Constant attention must be paid to increasing electricity generation, he said.

Dr De Villiers described the master plan to restructure South Africa's nuclear activities.

Umbrella

Dr De Villiers would become Executive Chairman on July 1 of the Atomic Energy Co-operation of South Africa — a body which would bring under one blanket umbrella the activities of the present Atomic Energy Board and the Uranium Enrichment Corporation, and which would control the issuing of nuclear licences to particular organisations.

Dr De Villiers said that the board had been criticised in the past for controlling as well as generating nuclear energy.

CSO: 5100/5683

HIGH TEMPERATURE, BREEDER REACTORS FACE DIFFICULTIES

Munich SUEDDEUTSCHE ZEITUNG in German 14 Jun 82 p 4

[Article by Martin E. Sueskind: "Tug-of-war Over the Graven Images of Nuclear Power"]

[Text] Bonn, 13 Jun--"Thus we find ourselves unable to participate in the financing of the THTR [thorium high-temperature reactor] 300...." Responses to this effect have been given to Federal Research Minister Andreas von Buelow in recent weeks by all the interlocutors from industry whom he had asked to put in writing their position on the further development of the thorium high-temperature reactor in Schmehausen, which is being threatened by a construction halt. Neither the electricity, coal and gas industry, nor the chemical industry cared to couple their basic interest in this reactor system--an interest which is geared to the long term--with an assurance of helping in its financing. But the research minister considers this assurance to be urgently needed, to keep the construction from having to be discontinued. The situation is muddled. If one were to go by a strictly business judgment, the discontinuation of the project would not be in doubt at all any longer.

But now in principle the situation with the THTR 300 is not different from that of the other mammoth project of nuclear-power research--which is still controversial for other reasons--the sodium-cooled fast breeder reactor SNR 300 which is being built at Kalkar on the Lower Rhine and which is known more popularly by the name "fast breeder." Both are prototypes for a further development of atomic energy which is oriented towards the distant future. They are wickedly expensive. It is difficult to get a hold on likely construction times. As yet their economic usefulness cannot be realistically estimated. On the other hand, the two construction sites have become prestige projects, which are being used as models by both proponents and opponents of nuclear power in their fighting of a sort of religious war: Aside from the whole dispute about scientific facts and hard cash, what is at issue here is also the question of whether in Schmehausen and Kalkar graven images can be erected or can be brought down. To that extent the quarrel over the SNR 300 and the THTR 300 contains a dimension of the irrational.

At present nobody can establish whether and when the fast breeder will be needed to help in the cost-efficient supplying of energy to the FRG, or whether the high-temperature reactor will ever be able to furnish sufficiently high temperatures for coal gasification at reasonable prices. The energy-policy discussion has not yet proceeded far enough to permit these reactor systems, along with all their possibilities, constraints, and risks, to be incorporated already in plausible calculations as a parameter for future conditions. On the contrary, the energy sector's current strong interests are in competition today with scenarios of science and politics which might become relevant the day after tomorrow--or might not. It is understandably difficult to part with sums in the billions for these purposes, at a time when neither the national budget nor industry's investment purse have much to give.

Notwithstanding this, the political leaders have not abandoned as yet the principle that both reactor systems should be promoted equally. In the present situation, the proponents of the high-temperature reactor draw the conclusion from this that if it should prove impossible to finance one of the two systems, both should be abandoned. As a matter of fact, even if this does not follow logically nevertheless it could be a politically inevitable consequence. Because the guarded approval of the German Bundestag for the further construction of the fast breeder has always been linked in the understanding of most deputies of the coalition--explicitly or not--with the expectation that also research on alternative reactors will be intensively supported. In the background has stood and stands anxiety concerning an irreversible entering into breeder technology and worry about a short-sighted abandonment of technological possibilities which might favor a "softer" energy policy even in the area of nuclear-power development. In a certain sense, this is represented by the high-temperature reactor, above all with respect to the safety question and the theoretically possible use of small reactors for the heating market.

Thus, hidden behind the desperate endeavors in the social-liberal camp which are aimed at tapping after all financing opportunities for the high-temperature reactor there is not only the coal-policy interests of North Rhine-Westphalia, but also the goal of postponing as long as possible the basic decision on taking a course in the direction of the "breeder state." Currently a working group made up of SPD and FDP members has submitted several financing models for the high-temperature reactor. They range from increasing the private share of the industry involved, past the use of a portion of the "coal pfennig," down to a consumption tax on brown coal and the imposition of a (voluntary or legally binding) research charge on the electricity industry.

But it seems that the last word has not yet been spoken. And the economics ministers of the Laender have not yet pronounced the death sentence on the THTR. To be sure, last week North Rhine-Westphalia was not given a majority vote on its idea of passing on the costs by raising the electricity rate, nor did Lower Saxony receive a majority with its proposal to impose a brown-coal tax. But from the fact that two Land governments which are oppositely led in terms of party politics have offered models for solutions on this subject, it is evident that there is still movement taking place--even if it could turn out that ultimately the decision is made more on grounds of regulative policy than for technical reasons. Indeed, the CDU/CSU is likewise in favor of the further construction of the THTR 300. Only it sees the obstacles as lying in a quite different area: In the domain of a licensing procedure which in its opinion is excessively restrictive in its handling. However, at this point the coalition then runs into fundamental difficulties. Because under no circumstances does it want to countenance safety curtailments.

12114
CSO: 5100/2194

EDF, CEA ANNOUNCE NUCLEAR PLANT EXPORT PROJECT

Paris REVUE GENERALE NUCLEAIRE in French Mar-Apr 82 p 199

[Text] EDF [French Electric Company] and the CEA [Atomic Energy Commission], acting through its subsidiary, Technicatome, plan to offer a medium power (300 MW) PWR [Pressurized Water Reactor] nuclear power plant on the export market.

In order to justify this project, EDF points out that a good many countries, though interested in starting a nuclear program, do not have a sufficiently developed system to handle plants with higher power of the type which are well suited to France. A satisfactory compromise between an acceptable cost and the prospects for the development of a large number of units suggested a nominal power in the vicinity of 300 MW, which has also been selected by other countries, such as Germany and Japan.

EDF and the CEA, through its subsidiary, Technicatome, by combining their skill and experience, have decided to support cooperation with developing countries or regions, and to offer a medium power PWR nuclear power plant for export.

Studies will be conducted to define a model, which will be a standardized unit which can then be adapted to each proposed site. So the model is limited to a standardized central unit, excluding all specific facilities and buildings of a site or client (pumping station, demineralization, administrative buildings, enclosures, etc.).

These studies are guided by the following major rules or objectives:

1. The cost must be competitive with the cost of a coal-burning plant.

2. French regulations and design and construction rules will be used.

3. Approval will be required from French safety officials.

4. By mid-1983 standard detailed specifications are to be completed, so that bids can then be prepared.

5. The experience acquired by both EDF and the CEA in design, construction, and operation will be used (including lessons learned from the TMI accident in the United States).

6. The model must be readily adaptable to a great variety of conditions related to the site or to particular requirements of the client.

EDF and Technicatome will direct these studies jointly through a Technical Orientation Committee and an Associated Systems Committee, handling volume control, safety injections, and cooling upon shutdown, along with the corresponding safety studies.

The balance of the model studies, including general engineering, are the responsibility of EDF and have been turned over to EDF's Tours Equipment Region, with the SEPTEN [expansion unknown] handling options related to safety through a steering committee and an orientation committee.

The principal features of the 300 MW project are given below:

a. The primary circuit is compact, and is based on an extrapolation of the CAP [Advanced Prototype Boiler] used at Cadarache and the boilers used for propulsion of France's nuclear submarines. In addition to the tank and its related equipment, it also has:

    1. two steam generators placed side by side in which the water caps are directly connected to the tank;

    2. two pumps integrated with the water caps of the GV [steam generators], of the immersed rotor type.

b. The internal instrumentation does not penetrate through the bottom of the tank.

c. The core consists of 97 pencil-type assemblies. Their design is identical to the assemblies used in the 900 and 1300 MW PWR plants, except for length. The duration of the cycles is 2 years.

d. The reactor is controled by rods. Boron is used only to compensate for fuel depletion and cold shutdowns.

e. The ovoid containment enclosure has a small volume, and is made of metal. Its sole function is containment. Protection from external attack is independent and is handled by a tunnel-shaped resistant structure.

f. In addition to the metal enclosure, the tunnel houses the fuel building and the electricity building.

g. The BAN [expansion unknown] uses an alveolar design. It contains rooms of standardized dimensions. Passageways for pipes and tubing are clustered in central corridors, and the peripheral corridors are reserved for personnel use and for electrical wiring.

7679
CSO: 5100/2180

INDUSTRY MINISTRY SEES WAY TO IMPROVE NUCLEAR PLANT PERSONNEL

Paris REVUE GENERALE NUCLEAIRE in French Mar-Apr 82 p 204

[Text] The Nuclear Facilities Safety Bulletin, published by the ministry of industry, in its issue no 25, reports on improvements being made in the training provided for personnel who operate nuclear power plants.

In 1980, the minister of industry formed a working group chaired by Mr Bourgeois, the scientific adviser to the high commissioner for atomic energy. The group was to examine the conditions governing the theoretical and practical training given to personnel who operate nuclear reactors. After investigating the existing situation by visiting the sites where reactors are in operation, and speaking with a number of persons with some special competence in the field of training, the working group issued a number of recommendations.

For EDF [French Electric Power Company], the group recommended that it establish a policy of early hiring to fill its normally expected job openings for personnel for new power plant units, that it reinforce the potential of the staff at the power plants, that it expand the use of simulators and operator assistance systems in handling the reactors during normal, incidental, and accidental situations, that it put to the best possible use a certain number of specialists trained in teaching in the nuclear field, and finally, that it make continuous use of the operating experience acquired at all its reactors for training purposes.

In line with these recommendations, EDF has begun, or in most instances, continued specific actions designed to improve its personnel training. As an example, some of these actions include:

a. Hiring supervisory personnel 2 years early and operations personnel 1 year early so that they can be given a general preliminary training even before their specifically nuclear training.

b. The addition of an engineer to the safety and radiological protection team on duty has been decided by EDF. The first engineers of this type have been trained and are now working in a number of the plants. These engineers should be able to contribute their analytical ability during any incidents, independently of the safety staff on duty.

c. In addition to increasing the number of existing simulators, EDF is trying to improve the performances of these simulators. These simulators are used to train personnel, both for accidents whose probability of occurrence is extremely low, and also for the analysis of more routine incidents which have already occurred in the nuclear plants.

d. Improvements have been made in the control rooms, particularly for the 1300 MW units now being completed. As an illustration, data of importance for safety in an accident situation have been placed in a single panel, and a diagnosis-assistance system for use in case of an accident is being developed.

EDF has set up a data collection and analysis system for incidents so that all the information of value for safety may be learned from these occurrences. This constant monitoring of events with safety implications goes beyond the strict limits of training, but it is producing a number of modifications, not only in the systems and components, but also in the procedures which the operators must apply. In terms of the analysis of incidents, human errors are carefully examined and in some cases lead to improvements in procedures and in training given in the power plants.

7679
CSO: 5100/2180

BRIEFS

SUPER-PHENIX ALMOST COMPLETED--Sodium deliveries to the Super-Phenix site are continuing, at the rate of 20 tons per week. By early April, over 1,500 tons of sodium were stored at the site. At that date, construction of the buildings was 95 percent completed, and the electrical equipment installation was 55 percent finished. The testing period has begun, with simulations of the reactor fueling. According to Mr Barberger, director of development of the plant, the reactor should go critical by approximately December 1983. [Text] [Paris REVUE GENERALE NUCLEAIRE in French Mar-Apr 82 p 204] 7679

CSO: 5100/2180

END

JPRS 81384

28 July 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 154

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WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 154

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ROK-CANADA SUMMIT TO EXPLORE MORE REACTOR SALES

SK060149 Seoul YONHAP in English 0133 GMT 6 Jul 82

[Text] Ottawa, July 5 (YONHAP) -- A senior external affairs source said Monday that additional Canadian sales of Candu nuclear reactors to South Korea would be a major topic of discussion at the forthcoming Korea-Canada summit talks scheduled for Aug. 28 to 31.

According to the source, the further promotion of bilateral commercial times will be a major item on the summit agenda, and additional Candu sales will be brought up in that context. Two-way trade between Seoul and Ottawa reached 1 billion [no monetary unit supplied] in 1981, nearly 40 per cent more than in 1980.

The source said it was his understanding that Prime Minister Pierre Trudeau had specifically mentioned Ottawa's interest in further Candu exports to Korea in a personal letter to former Premier Yu Chang-sun sent early this year.

Canada has already sold a 678-megawatt nuclear power plant to Korea, which is now under construction at Wolsong in southeast Korea. Canada wants to sell Korea three additional Candu units costing about 1.5 billion [no monetary unit supplied] the source said Ottawa urgently needs to sell more Candu units as its multi-billion-dollar nuclear industry is on the verge of collapse for lack of export sales. It has not sold a nuclear reactor at home or abroad since 1978.

CSO: 5100/2212

GANDHI: HEAVY WATER PRODUCTION TO DOUBLE

BK021717 Delhi Domestic Service in English 1530 GMT 2 Jul 82

[Excerpt] The prime minister has said that technical problems responsible for delays in heavy water plants have been identified. These are being rectified to raise production of this crucial nuclear material. Mrs Gandhi was speaking at the consultative committee of members of Parliament attached to the Departments of Space, Atomic Energy, Electronics, Science and Technology, Environment and Ocean Development. The meeting of the committee was held in New Delhi today.

Mrs Gandhi said the Kota heavy water plant will start producing reactor-grade heavy water before the end of the year. A target of 80 tons has been set for the production of heavy water by March 1983. The current production is 45 tons.

CSO: 5100/2212

BRIEFS

URANIUM PRODUCTION TO DOUBLE--The nuclear fuel complex [NFC], Hyderabad, is to double its production of natural uranium from 100 tons to 200 tons annually. This is to meet the growing requirements of this vital input in nuclear powerplants. A spokesman of the complex said in Hyderabad that the expansion program will be taken up in October next. The spokesman said that the NFC is supplying fuel to three power units at Kalpakkam, Kota and Narora. It will soon start supply to Kakarapara plant in Gujarat. [Text] [BK061410 Delhi Domestic Service in English 1230 GMT 6 Jul 82]

CSO: 5100/2212

AEC OUTLINES 10-YEAR NUCLEAR DEVELOPMENT PROGRAM

OW301217 Tokyo KYODO in English 1208 GMT 30 Jun 82

[Text] Tokyo, June 30, KYODO -- Japan's Atomic Energy Commission (AEC) Wednesday decided on a 10-year nuclear power development program aimed at developing fast breeder reactors for practical use around 2010.

The AEC, headed by Ichiro Nakagawa, cabinet minister and chief of the Science and Technology Agency, compiled the sixth long-term project after reviewing the present plan worked out in 1978. Officials said the new program was mapped out in view of inflated expectations for stabilized supply of nuclear power.

The new long-term plan, budgeted at yen 5,400 billion (at 1982 prices), estimates nuclear power in fiscal 1990 at 46 million kilowatt-hours (KWH), rising to 90 million KWH in fiscal 2000.

It recommends that the next-generation fast breeder reactor be brought into commercial operation by around 2010, and that 3,000 SWU (separative work unit) tons of enriched uranium be produced domestically annually by around the year 2000.

The AEC also proposed full utilization of plutonium through the advanced thermal converter reactor and the light-water reactor by 1990.

It looked forward to private industry's positive collaboration in building and running these plants, and suggested that the time has come for Japan to consider exporting nuclear power technology and related equipment.

With these prospects in mind, the AEC emphasized the need for the nation to promote a nuclear nonproliferation policy.

CSO: 5100/2212

BRIEFS

NUCLEAR REACTOR IN OPERATION--Malaysia entered the nuclear era today when scientists at the Tun Ismail Atomic Center [PUSPATI] in Bangi regulated for the first time the operations of its reactor. Minister of Science, Technology and Environment Datuk Amar Stephen Yong was present at the event this evening. Works to start off the chain reaction fission of the reactor was carried out under the supervision of the contracting firm, General Atomic Company, and an official from the International Atomic Energy Authority, IAEA. Datuk Amar Stephen said the event is significant to the country as the PUSPATI reactor is officially in operation for the first time. It also marked the development of science, especially in nuclear technology. Further works to test the reactor would take at least another 2 weeks. [Text] [BK281600 Kuala Lumpur Domestic Service in English 1130 GMT 28 Jun 82]

CSO: 5100/2212

'MORNING POST' REVIEWS PRC NUCLEAR DEVELOPMENT

HK070226 Hong Kong SOUTH CHINA MORNING POST in English 7 Jul 82 p 8

[By Foreign Affairs Editor David Chen]

[Text] The People's Liberation Army, which is undergoing extensive overall modernization, may now have tactical nuclear weapons in its arsenal, according to the Japanese news agency, JIJI.

In a dispatch from Beijing, the agency quoted the opinion of military analysts who examined a photograph published in a provincial newspaper, depicting a military exercise somewhere in the deserts of the Ningxia Hui Autonomous Region, in northwest China. The picture shows a mushroom cloud billowing from the desert hills and the caption to that picture says: "An 'atomic bomb' exploding deep in the ranks of the 'enemy.'"

The agency quoted Western military analysts in Beijing as saying that although the incident was "simulated," the exercise and the picture did indicate that China had already successfully developed small-scale tactical nuclear weapons and probably already had a certain number of such weapons in its arsenal.

Military analysts in Hong Kong said yesterday several exercises had taken place, particularly in the north and northwestern regions of China in the past year, but the Ningxia exercise, which was held in the second half of last month, appeared to be the biggest since the full-scale combined exercise in the hilly region of Zhangjiakou, 200 km northwest of Beijing, last September, when 200,000 troops took part.

A short report accompanying the picture said, in addition to the use of "atomic bomb," tactical fighters and bombers as well as rapid-firing rockets were also employed in the exercise. The exercise, the report went on, fully demonstrated the special qualities of modern warfare and the ability of the PLA to engage in such military conflicts.

Ningxia is a strategic autonomous region bordering on the People's Republic of Mongolia, where the Soviet Union stations several divisions. It is a part of the important border military region of Lanzhou, named after the provincial capital of Gansu Province. Only a month ago, Chinese television showed a full-dress parade in Lanzhou, with the participation of infantry, tank, artillery and missile units. The Lanzhou region is also the area where many of the army's missiles are tested.

In the middle of last year, China tested its first full-range ICBM with the successful launching of at least two such missiles into the southwestern Pacific. It was from the Lanzhou region, of which Ningxia is a part, that these missiles were launched.

The regional commander is General Du Yede, who took over from General Han Xianchu less than three years ago. Its political commissar is General Xiao Ke, another seasoned officer.

Development of the nuclear arsenal, including tactical weapons, is vested in the former Second Ministry of Machine Building Industry, now renamed the Ministry of Nuclear Industry. Although the personnel of the ministry changed drastically during and after the Cultural Revolution, scientists engaged in the development of nuclear devices have largely been left alone. They included the "father of China's atomic bomb," Dr Qian Sanqiang.

Until recently, the ministry was headed by an army officer, General Liu Wei. Since the reshuffle early this month, it has been headed by a woman scientist, 59-year-old Miss Zhang Zhen.

China first exploded a nuclear device at Lop Nor, southern Xinjiang, in October 1964. Since then, it has built up a sizeable arsenal of nuclear weapons, making it possibly the third largest nuclear power in the world.

The development of tactical nuclear weapons, if military analysts' assessments are correct, will represent a major step in this branch of weaponry.

Although not a signatory of the nuclear-ban treaty, China advocates disarmament of nuclear weapons.

CSO: 5100/2212

NEW NUCLEAR ENERGY AGREEMENT WITH U.S. SOUGHT

OW050405 Taipei CNA in English 0302 GMT 5 Jul 82

[Text] Taipei, 5 Jul (CNA) -- The government is actively cooperating with both the United States and Europe to push for the peaceful use of nuclear energy, according to the Atomic Energy Council of the Executive Yuan. In a report to Premier Sun Yun-hsuan Sunday the council revealed that the government is now drafting a new nuclear energy cooperation agreement with the United States in an attempt to speed up the use of nuclear energy in Taiwan. The Republic of China and the U.S. signed a cooperation agreement in 1955. The agreement is good for 40 years. It was amended once, in 1974. Cooperation with the U.S. has a great bearing on the research and development in the peaceful use of nuclear energy in Taiwan, the council reported.

The government sent experts to the United States and Belgium to study the use of nuclear energy and the technology behind safe stockpiling of nuclear waste. In addition, the government has invited experts from the U.S., Switzerland, Belgium and West Germany to give advice on nuclear energy use and to map out nuclear energy policies for reference. The government has sent and is continuing to let local experts make advanced studies on the possible course and take part in various training programs on how to achieve the safe use of nuclear power generation.

CSO: 5100/2212

PROGRESS IN SEARCHING FOR OIL, URANIUM REPORTED

OW251011 Taipei CNA in English 0942 GMT 25 May 82

[Text] Taipei, 25 May 9CNA) -- The Republic of China, in an effort to ensure a stable supply of energy, has made significant progress in the search of oil and uranium in collaboration with foreign concerns.

Government sources said this nation has signed or is going to sign contracts on exploration of oil with the Philippines, Indonesia, the United Arab Emirates and the Marshall Islands. The state-run Chinese Petroleum Corp. (CPC) is also studying the feasibility of prospecting oil off the Ivory Coast.

In the development of uranium, CPC, Taiwan Power Company, and another government enterprise have started exploration work in Paraguay together with two companies from the United States and South Korea.

The sources said the joint venture in a Philippine oil zone started its drilling operations last month, while the survey work on Luzon, the chief island of the Philippines, is under way. Preliminary survey at an oil zone in Indonesia has been completed by CPC and seven other foreign companies, and international bidding will be made in July.

CPC's subsidiary firm, Overseas Petroleum and Investment Corp. (OPIC), has recently obtained a share in prospecting oil in the United Arab Emirates. OPIC has also signed a contract with authorities of the Marshall Islands on oil survey, and a contract on oil exploration is expected to be concluded in the near future.

This nation depends heavily on imports for its oil supply, and the government has been making strenuous efforts to explore oil at home and abroad. In addition, the government is also encouraging the development of alternate energy and conservation of energy. Official statistics show that this nation's consumption of oil and oil products last year dropped 7 percent from the preceding year, while the use of coal and other alternate energy was on the rise.

CSO: 5100/2212

TAIWAN POWER COMPANY BUYS FRENCH URANIUM

OW041100 Taipei International Service in English 0100 GMT 30 Jun 82

[Text] The Taiwan Power Company has recently signed an agreement with COGEMA (Compagnie Generales des Materiaux Nucleaires) of France for the purchase of $300 million worth of concentrated uranium for its nuclear power generation project. As soon as the agreement is approved by the French and the Chinese Governments, the purchase will be considered confirmed. According to specialists, the concentrated uranium supplied by France will be able to fuel a nuclear power plant with twin 1-million-kilowatt generators for 20 years.

CSO: 5100/2212

TAIPOWER NEGOTIATING NUCLEAR FUEL REPROCESSING

OW220317 Taipei CNA in English 0252 GMT 22 Jun 82

[Text] Taipei, June 22 (CNA)--The Taiwan Power Company is negotiating with the French Company COGEMA (Compagnie Generales des Materiaux Nucleaires) to reprocess the spent fuel from the nation's nuclear power plants, which will exceed the storage capacity of each plan within 10 to 15 years, according to the utility's chairman, L.K. Chen. In a report to the Legislative Yuan, Chen said some of the reprocessed waste will be reused and the rest dumped. He declined to say where the reprocessed products would be used or to give any details on the talks. He stressed the products will not be used to make nuclear weapons.

COGEMA is a fully owned subsidiary of the French Atomic Energy Commission (CEA). It offers supplies and services for every stage in the nuclear fuel cycle, from concentrates uranium enrichment, fuel manufacture, in-core management, to transportation and reprocessing. In the last field, it is believed to be the most successful firm in the world. It also offers consultancy services for industrial projects at every stage of the nuclear cycle.

CSO: 5100/2212

CPCZ WEEKLY ASSESSES NUCLEAR POWERPLANTS

AU071513 Prague TRIBUNA in Czech No 26, 30 Jun 82 p 13

[Rudolf Unger article: "Program for the Future; Energy at the Crossroad"]

[Excerpt] Our reserves of steaming [energeticke] coal will be exhausted approximately in the year 2020, but already as early as the year 2000 they will actually begin to decrease. This reality is not only of great importance for the sphere of fuel, but also for the sphere of energy, since 11,800 MW of the current production of our energy system comes from thermal powerplants, 2,622 MW from hydroelectric powerplants and 880 MW from a nuclear powerplant. The logical consequence of the gradual reduction of the extraction of steaming coal also is the end of the historical era of the construction of thermal powerplants burning fossil fuels. The last "monuments" of this epoch are the Melnik "fivehundreder" and the individual blocks of the Prunerov II powerplant, which will go into operation this year.

In recent years our dependence on imported crude oil has been reflected in the sums allocated in the budget for the purchase of this priceless and vitally important liquid. However, the increased worldwide publicity surrounding prices of crude oil should not create the illusion that the generation of electricity from domestic resources -- be it coal or uranium ore -- costs next to nothing. If, for example, the construction of the Tusimice II powerplant with the installed capacity of 800 MW costs the state treasury more than Kcs4 billion, today's calculated price of the Temelin nuclear powerplant with the installed capacity of 4,000 MW already exceeds tenfold the cost of the Tusimice powerplant. The exceptional importance of this project is attested to not only by the Kcs50 billion allocated by the budget, but also by the concentration of this sum on an area of 240 hectares, where more than 10,000 construction and assembly workers will be deployed in the peak construction period.

The influence of energy generated by coal burning on the immediate as well as more distant environment is monumental, but at the same time also short-lived. Emissions from a powerplants' chimneys can -- by their omnipresence -- make the life of the population far and wide unpleasant and also considerably affect flora. But it is enough to halt the powerplant's operation and the skies above are azure blue again.

The ecological problems of nuclear engineering are different. Even during the full operation of the V-1 nuclear powerplant only a slight, white odorless little cloud leaves its chimney, and there is no fallout of solid particles. However, the storage of radioactive wastes, which result from the powerplant's operation and whose [radioactive] life is between 100 and 500 years, requires more attention and care. These wastes are temporarily stored in concrete blocks in the area of the powerplant, but for the future two regional storage places of radioactive wastes are being prepared -- in the Dukovany area for the Czech Socialist Republic, and in the Mochovce area for the Slovak Socialist Republic. The construction of the storage place, locating it in slightly permeable to impermeable soil, and the transformation of the wastes into solid matter create adequate safeguards against the escape of radioactive products into the vicinity of the storage place for the required safety [ochranna] period.

CSO: 5100/2212

BRIEFS

CSSR-CUBA NUCLEAR POWER COOPERATION--First Deputy of the Ministry of Fuels and Power M. Rusnak met on 5 July with the director of the Cienfuegos, Cuba, nuclear power station J. C. Castro Palomino. Palomino has been in Prague on a study trip. Discussed was intensification in mutual cooperation between the CSSR and Cuba in the area of nuclear power. [Prague SVOBODNE SLOVO in Czech 6 Jul 82 p 4]

CSO: 5100/3025

VICE PRESIDENT SPEAKS ON NUCLEAR WEAPONS, MILITARY UPDATING

Sao Paulo FOLHA DE SAO PAULO in Portuguese 18 Jun 82 p 5

[Text] Rio--The Brazilian Government's position on not developing atomic weapons is "implicit" in the nuclear agreement signed with Germany "but we have never said anything explicitly on that up to now," declared Vice President Aureliano Chaves yesterday. He refused to say whether or not Brazil intends to produce an atomic bomb in the long term, saying that "forecasts of the future cannot be made."

Aureliano Chaves recalled that Brazil is not a signatory of the Nuclear Arms Nonproliferation Treaty (NPT-1968) and that the treaty for banning nuclear weapons in Latin America (Tlatlelolco, 1967), which was signed by the country, has not yet been ratified. However, in the nuclear agreement with Germany, Brazil pledges to "use nuclear development for peaceful means" only.

The vice president, who with Minister of Navy Maximiano da Fonseca witnessed military exercises from on board the aircraft carrier "Minas Gerais," added that "More important than a declaration is a peaceful behavior and we have a behavior and a formal position in favor of peace and the peaceful solution of differences between countries."

Aureliano defended the "updating of the Armed Forces to the dimension and responsibilities Brazil has in the world today," qualifying this, however, by saying: "That does not mean the proposal of any arms race." To him "the basic problem for an armed force is the creation of technology for obtaining a certain degree of independence with respect to foreign equipment."

Position of Integrity

As far as Minister Maximiano de Fonseca is concerned, the fabrication of an atomic bomb "is simple, providing you have the raw material, which is enriched uranium." Pursuant to the agreement with Germany, however, Brazil cannot use German technology or the enriched uranium, fuel for the nuclear powerplants, for the production of bombs. It also agreed to submit to the supervision of the International Atomic Energy Agency.

Naval Aviation

"The great dream of the Navy is to have its own naval aviation," declared Minister Maximiano da Fonseca, who pointed out the importance of providing the aircraft carrier "Minas Gerais" with attack and intercept aircraft. At this time the aircraft carrier, the flagship of the fleet, has only six antiquated aircraft (American twin-engined P-16's) for antisubmarine missions, flown by officers of the Air Force.

According to the minister, the War of the Malvinas brought no lessons in terms of military usage but demonstrated that "a naval force without protection is sentenced to death." Maximiano said that the Navy "always claimed the right to operate the aircraft on board the 'Minas Gerais'," but has no interest in raising the question at this time because of a lack of resources and because he "maintains an excellent relationship with the minister of air."

8908
CSO: 5100/2206

GOVERNMENT OFFICIAL TELLS WAR COLLEGE OF NUCLEAR PLANS

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 2 Jul 82 p 29

[Text] The president of NUCLEBRAS [Brazilian Nuclear Corporations], Ambassador Paulo Nogueira Batista, declared yesterday that Brazil will be producing 60 tons of enriched uranium in 1986 and that in 1988 that capability will be raised to 300 tons per year. He also announced that NUCLEBRAS will begin to build its separative elements plant in Resende to produce its own "nozzles" and other equipment for the uranium enrichment plant.

Nogueira Batista also reported that next year NUCLEBRAS will begin the construction of the reprocessing plant, but refused to name the place where it will be installed. In a lecture at the War College [ESG], he declared that the nuclear agreement with Germany is a "package" in which the advantages to both sides were balanced harmoniously and for that reason there cannot be only a partial compliance by either of the parties.

That would mean, said the president of NUCLEBRAS, that the preservation of the agreement only in that which has to do with the transfer of fuel cycle technology, with the complete or even partial cancellation of the powerplant program, "a proposal made by some in good faith and by many with malice, would jeopardize the balance which is the great characteristic of the agreement, making its implementation unworkable."

Enrichment

For the first time, the president of NUCLEBRAS answered questions on the uranium enrichment process, saying that he does not have the slightest doubt that the "jet nozzle" system will work well and in a competitive manner compared to other processes such as gaseous diffusion and the ultracentrifuge.

Nogueira Batista said the "nozzle" process is not yet producing enriched uranium in Germany and that "it makes no sense to produce it on a laboratory scale because it would be uneconomical." He pointed out, however, that as of 1986 it will be producing on an industrial scale and that the last word on the economy of the process will be given in 1988 with the conclusion of the third phase.

He added that an initial cascade of 24 stages will be built first, using hydrogen as the conducting gas. Parallel with that unit, another will be built with a reduction of the "nozzles" to 100 micros, which represents "an improvement." That second unit will not use hydrogen but helium. Coupled to that industrial unit will come the third phase, which should be finished in 1988, using another system called "double deflation," also using helium gas.

8908
CSO: 5100/2206

IPEN PRODUCES URANIUM HEXAFLUORIDE ON LABORATORY SCALE

Rio de Janeiro JORNAL DO BRASIL in Portuguese 25 Jun 82 p 22

[Text] Sao Paulo--For the first time Brazil managed to produce a reasonable amount of uranium hexafluoride (UF6), the final raw material for the manufacture of the fuel for atomic powerplants. The material was processed by the IPEN--Nuclear and Energy Research Institute--in Sao Paulo, which already has a stock of nearly 50 kilos of the product.

This atomic material was produced on a laboratory scale, using an equally unusual prototype in the country, built by technicians of this institute for the production of fluorine, the basic ingredient for obtaining UF6. The program underway at the IPEN foresees the construction by 1984 of a pilot plant capable of producing up to 25 kilos of uranium hexafluoride per hour.

New Products

The IPEN, an agency linked to the Secretariat of Industry, Commerce, Science and Technology of the State, and to NUCLEBRAS, began this project from zero, since there was nothing of the type in the country or for sale abroad. The help of foreign technicians was required in the construction phase of the plant and even those services could not be provided at the desired rate because of a delay in the release of state funds in the first three months of this year.

In the technical area, according to the explanation by the superintendent of the institute, Hernani Lopes Amorim, the great problem was arriving at the production of fluorine.

"Up to then it was not done in Brazil and that which is used by industry came from abroad. It happens that there is no technology for sale abroad either and no one is willing to teach it," explained Amorim.

Thus, initially, the technicians built a device of electrolitic cells of 50 amperes each. Little by little more powerful prototypes were developed, it being possible to arrive at a 400-ampere unit which produced fluorine, which allowed the processing of uranium hexafluoride.

More than about the UF_6 itself, Hernani Amorim is euphoric about learning the technology of fluorine because of its propagating effect. The reason for this is that it will allow research, on a separate line, on sulphur hexafluoride (also inexistent in the country), which is the most advanced material for use in high voltage switches and transformers, replacing dielectric oil.

Uranium hexafluoride is the indispensable element for the fabrication of nuclear weapons, but this detail is a forbidden subject in conversations at the IPEN. In the first weeks of August, a 1,000-ampere fluorine device will be tested. In order for the plant to operate, six units of this same power will be necessary, or three 2,000-ampere units or a single 6,000-ampere unit.

The plant, which will be located on the University of Sao Paulo (USP) campus, will go into operation in March 1983, operating at below its technical capacity, however. In the following 12 months, the process will be improved until it will be possible to produce 25 kilos of UF6 per hour, which will be the nominal capacity of the plant. The product will allow NUCLEBRAS to proceed to produce pure nuclear fuel in another plant which is now being built in Resende (Rio de Janeiro).

Pilot Plant Initiated 2 Years Ago

Sao Paulo--The work of creating and installing the IPEN uranium hexafluoride pilot plant was begun nearly 2 years ago. The team was put together by Professor Alcidio Abraao, former researcher of the institute's staff, who after the beginning of those services appointed the industrial director, Jose Adreatta, who should finish the program in March 1984, chief of the group. This is one of the most important and largest IPEN teams. It has more than 100 technicians and scientists, including some from abroad, "because we had nothing, we had to use information contained in existing bibliography," explained the superintendent of the institute, Hernani Amorim.

At this time, those foreign specialists are no longer members of the team installing the plant in the IPEN area--on the USP campus--in a building of its own which is being built near the site where uranium dioxide is being produced for the CNEN [National Nuclear Energy Commission].

8908
CSO: 5100/2206

NUCLEAR CORPORATIONS ACCUSED OF FEATHERBEDDING

Director Denies Charges

Sao Paulo FOLHA DE SAO PAULO in Portuguese 22 Jun 82 p 1

[Text] "Like all state companies, we have an excessive number of employees. At this time our staff consists of 3,000 people, of whom 1,800 perform essential activities," the director of NUCLEBRAS [Brazilian Nuclear Corporations], Nei Freire de Oliveira Junior, admitted in Sao Paulo yesterday.

He denied, however, that the maintenance of a surplus of 1,200 employees means "featherbedding in NUCLEBRAS." What exists, he argued "is that all state companies are infected by the virus of bloat; that is the Brazilian reality."

NUCLEBRAS Issues Note

Sao Paulo FOLHA DE SAO PAULO in Portuguese 23 Jun 82 p 21

[Text] With respect to statements made by its director Nei Freire de Oliveira Junior published in yesterday's edition of FOLHA, NUCLEBRAS released the following official note:

"NUCLEBRAS declares that the report published today (yesterday), the 22nd, in a Sao Paulo newspaper on the surplus of personnel in the company has no basis in fact.

"Despite the fact that it is a young company with a recently increased area of responsibility, NUCLEBRAS has been exercising a policy of austerity in matters of personnel, both in that which refers to quantity and that which refers to levels of remuneration for its employees, who are paid only 13 wages [meaning unclear].

"Examples of that concern may be found in the decision by the company to make periodic adjustments in its staff of workers, as happened in 1981 when 20 percent of the employees were dismissed, and recently by the introduction of efficiency evaluations, pursuant to which for every 10 employees there were two dismissals for every four promotions. The use by the company of audits to determine attendance is another instrument which reveals the orientation toward austerity mentioned above.

"NUCLEBRAS, as is of public knowledge, is, on the other hand, seeking to impose a model of overall work in contracting construction or installation at firm prices and deadlines which would automatically reduce the need for a structure heavy with management and supervisory personnel, contrary to what happens in contracts through administration.

"Without the pretension of having reached the desired level in the use of its human resources, an objective which the phase of establishing itself makes more difficult for the company, NUCLEBRAS believes it is proceeding with a consistent and continued activity in that direction."

Editor's Note: FOLHA restricted itself in its edition yesterday to publishing the words of NUCLEBRAS Director Nei Freire de Oliveira Junior. During a talk he gave at the "Symposium on Management," sponsored by the Enterprise Management Study Group, at the Hilton Hotel, he said verbatim: "At this time our staff consists of 3,000 people, of whom 1,800 perform essential activities." The director added that "all state companies are infected by the virus of bloat; that is the Brazilian reality."

Major Stockholder Speaks

Sao Paulo FOLHA DE SAO PAULO in Portuguese 25 Jun 82 p 34

[Text] "For what little it does, NUCLEBRAS should have 400 to 500 employees and not a staff of 3,000 persons," declared Physicist Romulo Ribeiro Pieroni, who is the major private stockholder (person of NUCLEBRAS, Pieroni was director of the IEA (Atomic Energy Institute, the unit which preceded the present IPEN--Nuclear and Energy Research Institute) in the period from 1961 to 1979.

According to Ribeiro Pieroni, "There is no effective research in NUCLEBRAS, whether it be of a scientific or technological nature. We received the completed project from Germany, we simply executed it." In addition to that, he declared, "Ninety percent of the 3,000 employees only learned of the term 'nuclear energy' when they became part of the staff of that state company."

According to him, who has followed the phase of the implantation of nuclear programs in various parts of the world, the Japanese fuel element plant itself, which is owned by Mitsubishi, has only 71 people working in it. In 1973, when Japan had nine thermonuclear powerplants in operation, the number of people involved in nuclear activities was fewer than 2,000, he said. Pieroni made it a point to point out, however, that these numbers refer to 1973. The situation remains unchanged because Japan has not significantly increased the number of thermonuclear powerplants in commercial operation.

Romulo Ribeiro Pierono explained that even as a stockholder in NUCLEBRAS--he underwrote 20,000 of the 1 million shares that NUCLEBRAS inherited from its predecessor, the Brazilian Nuclear Technology Company--he is not notified of the dates on which company meetings are held. That is why, even without having a deep knowledge of what is going on in the state company, he is of the opinion that almost all its employees perform bureaucratic or pseudotechnical functions.

"The most that a few employees do is to study the German project of the KWU Siemens without proposing any changes because that would mean the promotion of structural changes in the equipment provided by the KWU, which obviously is not of interest to the Germans," he concluded.

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CSO: 5100/2206

PROSPECTS IN NUCLEAR ENERGY DEVELOPMENT OUTLINED

PA111250 Mexico City International Service in Spanish 0200 GMT 9 Jul 82

[Text] Jose Andres de Oteyza Fernandez, secretary of patrimony and industrial development, once said that the nation's proven uranium reserves, calculated to be 8,993 tons, would suffice only to fuel the Laguna Verde nuclear plant for its productive life of 30 years.

Uranium exploration in Mexico began in 1957. To date, the areas being mined are located in the states of Chihuahua, Nuevo Leon, Tamaulipas, Coahuila, Zacatecas, Queretaro and Puebla. However, regions where conditions favor the formation of uranium and that should be investigated include more than half of the nation's territory, according to experts in the field.

The national uranium exploration program began under difficult conditions, in financial and economic terms. Between 1957 amd 1970 the government invested only about 8 million pesos a year in the investigation, exploration and mining of uranium. Some 24 million pesos was invested in 1972 and 35 million was invested annually for the next 2 years; 76 million was invested in 1975, 50 million in 1977, 40 million in 1978, 250 million in 1979 and 390 million in 1980. The national energy program drafted by the Patrimony and Industrial Development Secretariat foresees the production of 4,780 tons of uranium from 1982 to 1991. The stored uranium will serve to initiate the operation of the country's first nuclear reactor in 1985 at Laguna Verde, Veracruz. This plant will supply electricity to meet the nation's requirements, thereby avoiding a total dependence on oil. Construction of Laguna Verde began in 1973 with the expectation that it would begin operating in 1978. Due to financial difficulties, however, the program was pushed back; according to latest reports, the plant will be in operation soon.

The national energy program envisages that Laguna Verde will produce 5.18 percent of the total electricity generated in Mexico by 1985. Currently, Laguna Verde works is 40 percent behind schedule. The delay has caused the cost of the project -- originally 4 billion pesos -- to have risen to approximately 75 billion. The government's growing interest in nuclear energy will permit this to become the second most important source of electricity in the country.

CSO: 5100/2212

BRIEFS

FEAR THREAT TO ENVIRONMENT--Mexico City, 30 Jun (NOTIMEX)--Mexico maintains the view that nuclear military arsenals are a threat to the environment and to the security of the species, the Foreign Relations Secretariat announced today. The Mexican Foreign Secretariat indicated that Mexico has always participated actively in efforts to guarantee ecological and environmental preservation, both of which are vital to the development of mankind. The secretariat noted that it has urged governments and the international community to strive to curb the arms race "in order to prevent further deterioration of the environment." It added that the greatest danger to ecology is the possibility of a worldwide conflagration. [By Mario Luis Altuzar] [Excerpts] [FL011245 Mexico City NOTIMEX in Spanish 0158 GMT 1 Jul 82]

CSO: 5100/2212

ATOMIC ENERGY OFFICIAL ON BUSHEHR POWERPLANT

LD291203 Tehran Domestic Service in Persian 1030 GMT 29 Jun 82

[Text] The head of the atomic energy organization of Iran, who had visited France and Switzerland, took part in an interview with IRNA after returning to Tehran.

Concerning the results of his trip, he said: During this trip, as we expected, the local court passed a verdict in Iran's favor with regard to the problems of the Bushehr powerplant and according to this verdict 35,000 tons of equipment intended for the Bushehr atomic powerplant and half of the fuel needed by the plant as well as many parts and machinery will be put at Iran's disposal.

The head of the atomic energy organization added: If the Majlis decides that the atomic powerplant should be completed, the equipment and the machinery will be used in that plant. Anything not needed may be used in other projects.

Concerning the Eurodif company, he said: During the years before the Islamic revolution, Iran put $1 billion as a loan at the disposal of the French atomic energy commission and the Eurodif company is a part of the commission. In addition, he said, as our contribution, Iran has paid more than half a billion francs to the Eurodif company.

The head of the atomic energy organization then said: In my recent trip to Paris, I again asked about Iran's money and what they have done with it but they did not give us a clear answer. In spite of the verdict of the court of appeals in Paris, the aforementioned company has refused to comply with the verdict.

CSO: 5100/2212

NUCLEAR PROGRAM VIEWED ON ANNIVERSARY OF ISRAELI RAID

London AL-DUSTUR in Arabic No 238, 14 Jun 82 p 125

[Article: "They're the Ones Watching Now"]

[Text] Iraq asserted that no power can sabotage its efforts at scientific and technical progress within the framework of its announced peaceful objectives. So said a newspaper bulletin issued by Iraqi cultural centers in Europe on the 1-year anniversiary of the Zionist attack on Iraqi nuclear reactors.

In London, Sa'd al-Bazzaz, the Iraqi press advisor and press spokesman at the Iraqi Embassy in London, issued a statement in which he alluded that Iraq was on its guard on various occasions against far-reaching Zionist plots to place Iraq strategically within the scope of these plans. He said that Iraq called for Arab solidarity toward these efforts.

The press spokesman said the Zionist entity's success in stricking blow after blow should not be attributed to any special capability on its part, or to the back of imperialist powers, as much as it is to the disarray of Arab ranks. Israeli official spokesman have stated publicly that they have provided military aid to Iran on the basis of their understanding that Iran is their natural ally, and that they are concerned that the Iranian regime should not be defeated in the ongoing war. Similarly, they are anxious to see the Iraqi army removed from direct confrontation with Israel. Despite the realization of this truth by all parties and their indication of its in their efforts to stop the war between Iraq and Iran, the Khomenyni regime still insists on continuing the war and cooperating with Tel Aviv against Iraq and the Arab parties concerned with confronting the Zionist enemy to standup in solidarity with Iraq and free its forces from their commitments in the Iranian front. But certain of these parties have done just the opposite by inciting Khomeyni to carry on the war with Iraq. Tel Aviv is backing them with war material, money and troops.

When Zionism undertook its new aggression, those so-called Arabs, who stood by and watched the day the Iraqi nuclear reactor was hit and helped the Khomeyni regime with the Zionists, now stand by and watch the annihilation of the Lebanese and Palestinian peoples while their forces stand only a few meters from the battlefield. They watch Lebanon get torn apart as they enter into an unholly alliance with the Zionist entity. New shame covers the Syrian regime. Every day exposes documented evidence of its treachery and its role of sabotage.

The press spokesman's statement said that, on the first anniversary of the shelling of the nuclear reactor, Iraq asserts that no power on earth can sabotage its efforts at scientific and technical development within the framework of its publicly-stated, peaceful objectives. The world is wary of the Israeli nuclear policy bent on aggressive goals and exposing the world's safety to danger. All powers call on the greedy heads of the Zionist entity to adhere to the nuclear non-proliferation treaty and other international obligations that impose inspection and supervision of operations in the anterooms of the Zionist nuclear reactors. Despite the desertion of lowly Arabs and the cooperation of Tel Aviv with Tehran, Iraq remains a symbol of the Arabs's determination to achieve rebirth, independence and progress.

In Athens, Na'il 'Abd-al-Jabbar, Iraqi press attache in Greece, issued a statement on the same occasion which reaffirmed that the treacherous attack on the Iraqi nuclear reactor is considered to be an affront to the most elementary rules of international behavior. It called on the Free World to make a resolution to suppress Zionist attacks on the Arab nation.

The statement added that the cooperation of certain enfeebled Arab regimes with the Persian regime, and their material and morale support of it at a time when all the evidence points to pre-planned and documented cooperation between the Zionist entity and the Persian regime in striking at Iraq, indicate the magnitude of this conspiracy which aims at suppressing the truth.

The statement said that those Arabs who stood by and watched when the Iraqi nuclear reactor was hit, today also watch as the Zionist enemy occupies new Arab territory in Lebanon. The statement asserted that Iraq will remain steadfast and strong, and that the treacherous Persian and Zionist forces will be unable to kill Iraq's spirit of victory and alter its triumphant course towards scientific and technical progress.

9945
CSO: 5100/4725

ISRAEL

BRIEFS

NUCLEAR REACTOR NOT ECONOMICAL--A special committee appointed by the energy minister thinks it will not be economical to build a nuclear power reactor made in Israel because it will cost two or three times as much as such a reactor purchased overseas. This was discovered by our correspondent Gadi Sukenik. The committee was appointed in order to examine all the aspects pertaining to building nuclear power reactors in Israel and is headed by Technion President 'Amos Horev. The committee convened this week for its final session and in a month will present its conclusions. [Text] [TA010757 Jerusalem Domestic Service in Hebrew 0700 GMT 1 Jul 82]

CSO: 5100/4726

COMPREHENSIVE NUCLEAR CONTROL BILL INTRODUCED

Johannesburg DIE TRANSVALER in Afrikaans 27 May 82 p 4

/Text/ Capetown--A comprehensive draft legislation for controlling all atomic or nuclear matters was published here yesterday.

The draft legislation on nuclear energy, which consists of 84 clauses, has provisions for the establishment of a Nuclear Energy Corp of South Africa and a Council for Nuclear Safety.

The Nuclear Energy Corp of South Africa will be doing research in the area of nuclear or atomic energy and undertake the production of nuclear or atomic energy for the purpose of enriching, processing and reprocessing source material and special nuclear material, according to the legislation. It will also exercise control over certain nuclear activities in the republic.

The Council on Nuclear Safety will have the responsibility of adivising the corporation on nuclear licensing and it will also have responsibility in matters pertaining to safety and health connected with the building and using of nuclear installations and the storage and transportation of dangerous nuclear material.

Submarine

In compliance with the legislation, no ship or submarine propelled by nuclear power, or having dangerous nuclear material on board, shall proceed to South African territorial waters or to a South African port without obtaining a nuclear license from the corporation.

An important stipulation in the draft legislation provides for the accountability regarding nuclear damages. The procedures which must be followed in the event of such nuclear accidents are therein described, while it is also established that the corporation will keep records of the names of all persons who have found themselves in an ascertained area of risk during or after a nuclear accident.

7964
CSO: 5100/5674

OFFICIAL DESCRIBES NUCLEAR SECURITY COUNCIL

MB290808 Johannesburg Domestic Service in English 0500 GMT 29 Jun 82

[Text] The new executive of the Atomic Energy Corporation, Dr Wynand de Villiers, says an independent council which will control all security arrangements for all nuclear installations in the country is soon to be created. Addressing the Pretoria Press Club, he said it would be known as the Council for Nuclear Security.

It would function separately from the Atomic Energy Corporation, and the staff of the corporation, of its affiliates, or of the electricity supply commission would not be allowed to serve on it. He said the council would have the power to veto the license application of any nuclear installation, and would advise the government on all aspects of nuclear security.

Dr de Villiers said it was essential that a nuclear development program be established for South Africa as soon as possible. This would be one of the tasks of the corporation, which would come into existence this week, as part of the rationalization of the country's nuclear industry. He said he believed it would be profitable to establish plants like Koeberg in the eastern Cape and on the Natal coast in the forseeable future. Dr de Villiers said that work on the Koeberg plant was progressing according to plan, and it would begin producing nuclear energy in the second half of the next year, 6 and 1/2 years after the project was launched. This was quite an achievement if it was considered that on average it took 12 years to establish a nuclear powerplant in the United States.

CSO: 5100/2212

FINES IMPOSED FOR FAILURE TO OBSERVE NUCLEAR SAFETY MEASURES

Capetown DIE BURGER in Afrikaans 17 Jun 82 p 13

[Text] A Kempton Park company which is using accelerated radioactive sources for inspection purposes, as well as a director and an employee of this company, were fined the day before yesterday by the Capetown District Court for the respective sums of 2,400, 200 and 500 rand.

The accused have violated the Atomic Energy Act as a result of not having complied with certain conditions attached to the authorization for using radioactive material for inspection purposes.

This case ensues from an incident of last year when an isotope at the Salt River power station was being used by an unauthorized person who lost the isotope in a steam kettle. He was inspecting a welded seam.

Melvin John Freeman (35) of Evandale, the director of Industrial Inspection (Pty) Ltd, appeared in court in the name of the company and in his own capacity. Freeman was fined 200 rand; a worker of the company, Paul Michael Stone (34) of 9 Washington St, Claremont was fined 500 rand and the company was given fines totaling 2,400 rand.

The accused appeared in court on the following charges:

On 22 April of last year they permitted an unauthorized person, a radiographist apprentice, a certain Mohammed Gaffor, to practice industrial radiography at the Salt River power station without the necessary supervision.

Gaffor was not given a medical inspection and declared medically fit for the work which he had performed.

Nothing was done to provide Gaffor with a pocket dosage meter. A pocket dosage meter is a safety instrument forming a part of the equipment of a radiation worker.

Stone failed to notify the responsible person and the owner of the premises that radioactive material was missing, or alternatively, that those found guilty failed to notify the Atomic Energy Board that the isotope was missing and neglected to take immediate measures to recover the isotope.

Those guilty had failed to maintain a logbook.

Sentence

Two of the charges (5 and 6) against all three of the accused were withdrawn.

The company admitted guilt to charges 1, 2, 3, 7 and the alternative to charge 4 and was therefore found guilty.

Stone was found guilty of having failed to notify the responsible person and the owner of the premises that the radioactive material was missing. The other charges against him were withdrawn.

Isotope

A. P. Hanekom, radiation inspector of the Atomic Energy Board (AEB) yesterday testified that one of the main functions of the AEB is to exercise control over radioactive material and to prevent the consequences which radiation can have on a person. "This is the reason why the AEB must be notified at all times when something of this nature is lost."

In this incident nobody was exposed to radiation. The isotope in the steam kettle was encased in a steel enclosure and he testified that it was recovered later.

Hanekom also testified that in 1978 a construction worker at Sasolburg picked up a similar isotope and put it in his shirt pocket. He incurred such severe radiation burns that later some of his fingers had to be amputated.

Stone testified that he failed to section off the area when in the course of the evening he looked for the missing isotope.

The state prosecutor, T. J. Prins, maintained that the AEB had approached the company for a report and that there is the possibility that the matter could have been covered up if the company had not been approached.

Attorney Prins said that it was clear that Stone was not qualified to work as a radiographist, because originally he failed to pass an examination which he had to take after his certification was withdrawn after the incident, but it was attested that he passed the examination later.

Verdict

In his verdict District Magistrate J. S. C. van Graan stated that the court heard that the gamma rays emitted by the isotope could cause cancer growths and could have extremely harmful effects on the body. "This is the reason that regulations are necessary for protecting the public."

Freeman was acquitted of the four charges 1, 2, 4, and 7, but he was found guilty of the alternative charge of having failed to inform the AEB immediately that the isotope was missing. Magistrate Van Graan said that Freeman was not there when the incident took place. He came to Capetown as soon as possible and recovered the isotope. The necessary measures were also taken for preventing a similar incident in the company in the future.

S. C. Mortinson (of Bell, Dewar and Hall of Johannesburg) appeared on behalf of the accused.

7964
CSO: 5100/5677

EXPORT OF NUCLEAR MATERIALS, TECHNOLOGY ENACTED

Moscow FOREIGN TRADE in English No 4, Apr 82 pp 48-49

[Text] The USSR Council of Ministers on January 13, 1982 approved an Enactment on the export of nuclear materials, technologies, equipment, installations, special non-nuclear materials, and services. Below is given a summary of the Enactment.

The Enactment is for the regulation of the export of nuclear materials, technologies, equipment, installations, special non-nuclear materials, and services (Soviet nuclear exports) for peaceful purposes from the USSR to countries not possessing nuclear weapons.

The definition of the terms: nuclear materials, technologies, equipment, installations, special non-nuclear materials, and services referred to in the Enactment are given in the Annex.

Soviet nuclear exports are effected in accordance with the Soviet Union's policy on nuclear arms non-proliferation and its obligations arising out of the Treaty on the Non-Proliferation of Nuclear Weapons and other international treaties, agreements and understandings signed by the USSR.

Soviet nuclear exports to countries not in possession of nuclear weapons may take place, provided such countries undertake that the exported articles they acquire, as well as the nuclear and special non-nuclear materials, installations and equipment made on the basis of the exported articles or as a result of their application;

a) shall not be used for the manufacture of nuclear weapons or other nuclear explosive devices, or be used to attain any military aim;

b) shall be under the control (safeguards) of the International Atomic Energy Agency (IAEA) during the entire period of their actual utilization;

c) shall be given physical protection at a level not lower than that recommended by the IAEA;

d) will be re-exported (exported) or transferred from the jurisdiction of the recipient country only on the terms provided for in the Enactment; re-export or transfer of export articles proper will take place with the written consent of the relevant Soviet foreign trade organization (in the event of multi-stage re-export, such a consent may be obtained both directly from the Soviet foreign trade organization and through the intermediate re-exporters).

The obligations referred to above must be formalized by the competent government bodies of the recipient countries by assuming such obligations in connection with concrete nuclear deliveries from the USSR or by referring to their obligations under the existing multilateral or bilateral treaties, agreements, contracts and other contract law acts in which the Soviet Union or the relevant Soviet bodies and organizations participate.

Soviet nuclear export operations shall be performed by foreign trade organizations of the Ministry of Foreign Trade of the USSR and of the USSR State Committee for Foreign Economic Relations. Draft agreements and/or contracts with foreign partners as concerns the terms of nuclear exports shall be agreed with the State Committee for the Utilization of Atomic Energy of the USSR and the Ministry of Foreign Affairs of the USSR.

Nuclear export articles shipment may be initiated from the USSR only on receipt by the relevant Soviet foreign trade organization of the recipient country's obligations referred to above, and provided there is an agreement on safeguards between the recipient country and the IAEA, with all the additional documents thereto, which are necessary for effecting the said safeguards.

In the event obligations provided for in the Enactment are violated in the recipient country, nuclear exports from the USSR to that country shall be suspended until the said violation is eliminated.

Simultaneously with the suspension of exports the Ministry of Foreign Trade of the USSR and the USSR State Committee for Foreign Economic Relations, with the participation, if necessary, of the Ministry of Foreign Affairs of the USSR and the State Committee for the Utilization of Atomic Energy of the USSR shall take measures in accordance with the appropriate rules of international law and the USSR's international treaties to ensure the fulfilment by the recipient country of the obligations it has assumed.

ANNEX

to the Enactment on the export of nuclear materials, technologies, equipment, installations, special non-nuclear materials, and services.

Definition of the terms contained in the Enactment on the export of nuclear materials, technologies, equipment, installations, special non-nuclear materials, and services

The terms: nuclear materials, technologies, equipment, installations, special non-nuclear materials, and services referred to in the Enactment are defined as follows:

1. **Nuclear materials**—uranium (depleted, natural or enriched, including uranium-233), plutonium and thorium, any of these substances in the form of metal, alloy, chemical compound or concentrate in quantities exceeding the limits specified in subclause (a) for a definite recipient country during a period of 12 months with the exception of materials referred to in subclause (b).

a) enriched uranium, including uranium-233

plutonium	50 effective grams
natural uranium . . .	500 kilograms
depleted uranium . . .	1,000 kilograms
thorium	1,000 kilograms

b) plutonium with an isotopic concentration of plutonium-238 exceeding 80 per cent.

Uranium or plutonium used in gram quantities or less as sensing elements in instruments.

Depleted and natural uranium or thorium in relation of which there are assurances by the competent government bodies of the recipient country to the effect that they are intended for use in non-nuclear activities alone (such as the production of alloys and ceramics) as a result of which they practically cannot be regenerated.

2. **Technologies**—information of any kind (including samples of materials and models of equipment, and data communicated for the training of specialists), which can be used when designing, producing, exploiting or testing nuclear materials, equipment, installations and special non-nuclear materials.

3. **Equipment and Installations**—any equipment and installations intended or prepared specifically for producing, processing or using nuclear or special non-nuclear materials, including:

3.1. Nuclear reactors capable of operation in controlled self-sustaining fission chain reaction conditions, excluding zero-energy reactors, the latter being defined as reactors with a designed maximum rate of plutonium production not exceeding 100 grams a year.

3.2. Reactor pressure vessels:

Metal vessels as complete units or as major shop-fabricated parts therefor which are especially designed or prepared to contain the core of a nuclear reactor as defined in paragraph 3.1 above and are capable of withstanding the operating pressure of the primary coolant.

3.3. Reactor fuel charging and discharging machines: Manipulative equipment especially designed or prepared for inserting or removing fuel in a nuclear reactor as defined in paragraph 3.1 above capable of on-load operation or employing technically sophisticated positioning or alignment features to allow complex off-load fuelling operations such as those in which direct viewing of or access to the fuel is not normally available.

3.4. Reactor control rods:

Rods especially designed or prepared for the control of the reaction rate in a nuclear reactor as defined in paragraph 3.1 above.

3.5 Reactor pressure tubes:

Tubes which are especially designed or prepared to contain fuel elements and the primary coolant in a reactor as defined in paragraph 3.1 above at an operating pressure in excess of 50 atmospheres.

3.6. Zirconium tubes:

Zirconium metal and alloys in the form of tubes or assemblies of tubes, and in quantities exceeding 500 kg per year, especially designed or prepared for use in a reactor as defined in paragraph 3.1 above, and in which the relationship of hafnium to zirconium is less than 1:500 parts by weight.

3.7. Primary coolant pumps:

Pumps especially designed or prepared for circulating liquid metal as primary coolant for nuclear reactors as defined in paragraph 3.1 above.

3.8. Plants and installations for the re-processing of irradiated fuel elements, and equipment especially designed or prepared therefor.

3.9. Plants and installations for the fabrication of fuel elements.

3.10. Equipment, other than analytical instruments, especially designed or prepared for the separation of the isotopes of uranium.

3.11. Plants and installations for production of heavy water, deuterium and deuterium compounds and equipment especially designed or prepared therefor.

4. **Special non-nuclear materials:**

4.1. Deuterium and heavy water:

Deuterium and any deuterium compound in which the ratio of deuterium to hydrogen exceeds 1:5,000 for use in a nuclear reactor as defined in paragraph 3.1 above in quantities exceeding 200 kg of deuterium atoms for any one recipient country in any period of 12 months.

4.2. Nuclear grade graphite:

Graphite having purity level better than five parts per million boron equivalent and with a density greater than 1.50 g/cu.cm, in quantities exceeding 30 metric tons for any one recipient country in any period of 12 months.

5. **Services** —Operations performed by the Soviet Union relating to any change in the form or properties of a foreign customer's nuclear and special non-nuclear materials, including operations relating to nuclear material isotopic enrichment, preparation of fresh and processing of irradiated nuclear fuel.

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"Foreign Trade", 1982

CSO: 5100/1005

ATOMIC WASTE STORAGE TO BE READY IN 1988

Frankfurt/Main FRANKFURTER ALLGEMEINE in German 19 June 82 page 5

[Text] The Federal Government is expecting the first final storage for weakly radioactive wastes and demolished parts of shutdown nuclear power plants in the Federal Republic of Germany to start operating by 1988. The final storage will be set up in the former "Konrad" Iron Ore Mining Works at Salzgitter-Bleckenstedt, whose suitability was investigated by the "Gesselschaft fur Strahlen- und Unweltforschung mbH" (GSF) [Association for Radiation and Environmental Research] Munich. The GSF has now given in Salzgitter results of its more than 5 years of suitability studies completed in spring for the "Konrad" Mining Works, under a contract from the Federal Research Ministry. It is apparent from the 850 pages long final report of the GSF (F.A.Z. of 7 April) that "no aspects have been found counterindicating the suitability of the Mining Works as final storage for weakly radioactive wastes". This applies both to the geological and mining technology conditions and the nuclear technology safety requirements.

Naturally the hopes for satisfying the disposal expectations within 6 years is related to two decisive prerequisites. On one hand the prescribed planning procedure, whose beginning will presumably be decided in August by the competent "Physikalisch-Technische Bundesanstalt Braunschweig" [Physical and Technical Federal Agency of Braunschweig] (PTB) according to the announcements in Salzgitter must end duly with a positive decision of the Lower Saxony Ministry of Social Affairs. On the other hand it should be legally possible to take up the equipment of the Mining Works for final storage purposes already during the planning procedure, a point which has not yet been clarified by the competent legal authorities.

The Federal Government has already spent nearly 60 million marks for the previous research program for the "Konrad" final storage project. The operating costs for the Mining Works--ninety employees are still employed there currently--will be for this year alone 11.5 million marks; with the same personnel numbers they will probably increase slightly in the next few years. The investment costs for the conversion must be estimated at at least 100 million marks. According to the plans cavities of more than a million cubic meters can be excavated in the galleries of the Ore Mining Works which lie at depths between 800 and 1200 meters. The future final storage should take up altogether 500,000 cubic meters of weakly radioactive wastes, weighing altogether 1 million tons, about 20,000 cubic meters every year. About 200 employees would be needed to operate the final storage.

9018
CSO: 5100/2204

TORE SUPRA TOKAMAK TO USE NEW SUPERCONDUCTOR MAGNET TECHNIQUE

Paris CEA NOTES D'INFORMATION in French Jan-Feb 82 pp 14-20

[Article: "Controlled Thermonuclear Fusion: Tore Supra Will be the Backbone of Euratom-CEA's Program for the Next Ten Years"]

[Text] On 15 July 1981, the Advisory Committee for the European Fusion Program, meeting in Brussels, decided to grant priority status to the French Tokamak project*, Tore Supra. This decision now makes it possible to begin the construction of this large machine and to bring together all of the CEA's [French Atomic Energy Commission] resources for research on fusion by magnetic containment. These resources are now at Fontenay-aux-Roses and at Grenoble, and will be transferred to the Cadarache Nuclear Research Center. This decision effectively means that the Community will pay 45 percent of the cost of developing this machine.

Tore Supra will use for the first time superconductor magnets in a large-size Tokamak. It will form the backbone of the French program for the next 10 years. It is part of the research leading to a medium-field Tokamak reactor, which now seems to be the most promising line of fusion research.

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* Tokamak: a device designed to contain a plasma within a toric chamber by using the combination of two magnetic fields: one main axial magnetic field, created by coils surrounding the toric chamber, and a secondary transversal magnetic field, created by an intense electric current passing through the plasma ring. This electric current also heats the plasma; it is induced by a transformer whose secondary winding is the plasma itself. The resulting magnetic field creates a moderate shearing action which favors the containment of the plasma.

The Tore Supra program does seem to complement the rest of the European program quite well, particularly the JET [Joint European Torus]. It is a necessary phase before undertaking the development of an experimental reactor, as proposed in the NET [Next European Torus] studies.

For the 1979-1983 5-year plan, the Community budget calls for spending 634 million ECU [European Currency Units] for the general program, in addition to 243 million ECU for the JET. In all, this amounts to over 5 billion francs.

This decision is the logical outcome of the efforts the CEA has been making since 1958. Its work has enabled it to achieve world-class results.

The entire Tore Supra operation has been a significant factor in decentralization. It has had a considerable impact on regional activity in France. During the first phase, work began at the construction site, and about 100 million francs were spent on civil engineering over a 5-year period. In the second phase, a new research laboratory was opened in the Provence-Cote d'Azur region. Based on the expected upgrading of resources, by 1986 this research facility will have over 350 physicists, engineers, and technicians, with an annual operating budget of about 200 million francs. This laboratory will establish very close relations with university research facilities and with the CNRS [National Center for Scientific Research] in the Provence-Cote d'Azur region.

Fusion Programs in the European Community and Throughout the World

Research on controlled fusion in the European Community nations is covered by association contracts with EURATOM, which provide financial contributions by the European Communities Commission. The European program covers the efforts of seven of the Community countries (Greece, Ireland, and Luxembourg do not contribute directly), and Sweden and Switzerland are associated by contract. The total Community effort for the 1979-1983 plan comes to over 5 billion francs.

The program presented by the Commission for the 1982-1986 period calls for a sizeable increase in activities of a technological nature in order to prepare for the post-JET phase (NET); it also includes taking over the operating expenses of the JET, and the investments needed so it can reach its goal of obtaining a thermonuclear plasma. The amount of spending budgeted comes to 1.5

billion ECU, which includes 442 million for the JET. Tables A and B give the proposed budgets for the two 5-year periods, broken down into major spending categories, along with a comparison of the non-JET budgets of the European countries for the first 3 years of the current plan. The reader will observe the relative importance of the German program (40.8 percent). France's share is a little less than 20 percent, to which should be added 2 percent of the JET spending paid as a direct contribution.

Research on Fusion by Magnetic Containment in the Community

Table A:	1979-1983 5-Year Plan (millions of ECU)	Program applications for 1982-1986 (millions of ECU)
General spending of Associations	496	613
Priority actions	130	212
JET support		34
Technology		190
Management and overhead costs	8	13
Total excluding JET	634	1,062
JET	243.1	442.3
Total	877.1	1,504.3

Table B: Comparison of Non-JET National Budgets for the 3-Year Period Covering 1979, 1980, and 1981

Country	Millions of ECU	Proportion (in %)
Federal Republic of Germany	168.4	40.8
France	81	19.6
Great Britain	75	18.2
Italy	36.5	8.8
Netherlands	21.2	5.1
Belgium	9.4	2.3
Denmark	2.6	0.6
Subtotal of Community countries	394.1	

Sweden	5.6	1.4
Switzerland	13.3	3.2
Total	413	100

As a comparison, the funding for this type of research in the United States was $383 million in 1981 and will be $460 million in 1982. Financing provided by the Soviets, which is not so well known, seems to have reached a plateau now, after being comparable to the U.S. funding for a long time. The Japanese budget, by itself, is of the same magnitude as the Community budget.

The French Program

The French program is conducted entirely by the CEA's department of fusion research, which uses the two sites of Fontenay-aux-Roses and Grenoble.

The CEA's fusion activities, which began in 1958 on a very modest scale, have gradually expanded. During the first 10 years of the program, their work was still highly diversified. A significant change was made in 1970, and the program then began to concentrate on the Tokamak and the development of plasma heating methods. These choices were found to be wise, and have enabled the CEA to reach a world-class level because of the quality of its results. Starting in 1973, the operation of the TFR [Fontenay-aux-Roses Tokamak] gave France a tool which was the best equipment of this type in the world, until the start of the large American Tokamak in Princeton in 1976. The use of powerful supplemental heating methods on this equipment enabled it to hold the world record for ion temperature in 1975, with a temperature of 20 million degrees in a plasma heated by neutron injection. Again in 1981 it held a world record with a plasma heated by high frequency, also to 20 million degrees, but with a plasma density comparable to that required for a thermonuclear fusion reactor plasma. These achievements have made the CEA the European leader in supplemental plasma heating, a technique that is essential for the future of fusion. A policy decision made in the Community program brought about a considerable development in active cooperation efforts for the use of these methods in other European devices. In 1981, 20 percent of the personnel and budget resources were devoted to these activities, 75 percent of which was for support of the JET program.

France's role in the Community program, which is now both important and recognized, led to the 15 July decision made in Brussels by the Advisory Committee for the European Fusion

Program, granting priority status to the French superconductor magnet Tokamak project. This decision means that 45 percent of the cost of developing this machine will be paid by the European Communities Commission.

The French project proposes a new technical solution, by the use of superconductor magnets in the presence of a rapidly varying magnetic field. This is a technological phase that is an essential technological stage leading to the development of the reactor. It will also provide a means of studying physical problems in conditions very close to those of the reactor but in a non-active machine, which is therefore more accessible than the JET will be. The JET is designed to reach plasma ignition as quickly as possible, by using a deuterium-tritium blend. Using the Tore Supra, different techniques of heating to the temperatures required for ignition and for studying the containment of plasmas at a high temperature can be studied. Tore Supra will also make long duration discharges, so that the continued interaction of the hot plasma with its material environment in the reactor can be studied.

The Tore Supra complements the European program quite well, particularly the JET.

France does plan to play a major part in the technological program which will be expanded during the years from 1982 to 1986. The CEA's contribution will be of particular importance, as the Community will benefit from the results of studies done on fission reactors. These technological studies will be conducted in the following areas: superconductor technology, use of tritium, regeneration of tritium in a lithium cover and extraction of the heat produced, behavior of the materials, and safety.

The advances in knowledge of magnetic containment in recent years have been quite significant both in France and elsewhere in the world. These advances have been helped by free and rapid communications throughout the entire world, including the USSR.

Current extrapolations suggest that the JET and its American counterpart, the TFTR, will before too many years provide a scientific demonstration of the feasibility of fusion. That is why preparations are starting now for the following generation, the NET. This is an important phase, but it will still not be a demonstration reactor producing electricity. The NET, which could be approved at the end of this decade, would produce thermonuclear power of several hundred megawatts. It would use superconductor circuits and would have a cover for tritium regeneration. It should play an important part in the final development of a demonstration reactor (the thermonuclear equivalent of the Phenix reactor).

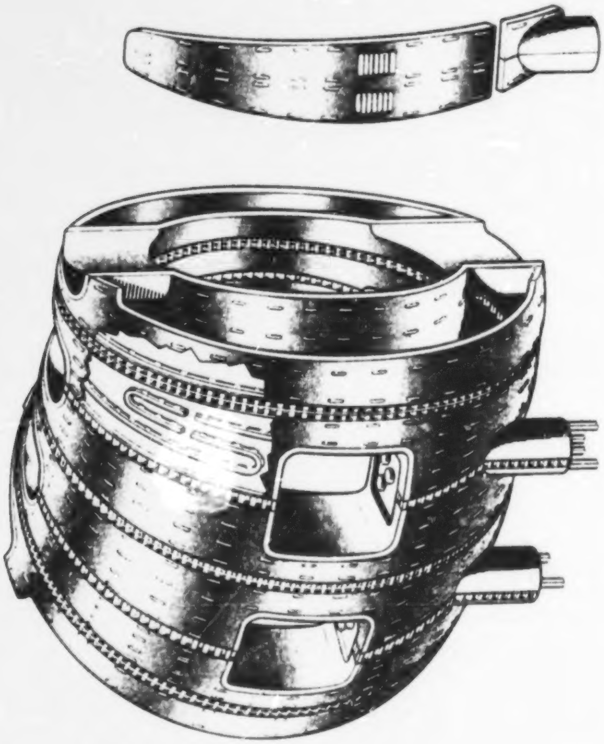

Figure 1: Portion of a thermal screen cooled with gaseous helium.

International cooperation for this expensive development is certainly desirable, but it is clear that Europe will have to acquire, like the United States and the USSR, mastery of all the necessary techniques required for the development of a fusion reactor.

The Tore-Supra Project in the Fusion Program

This project is part of the fusion by magnetic containment program. In this field research is typified by a difficult sort of overlapping of the problems related to the container--the containment device--and problems related to the content--the ionized gas or plasma. The containment device determines the performances of the plasma, and in return the behavior of the contained plasma determines the machine's specifications. So successive extrapolations are made, with each generation of the machine adding a useful contribution to our knowledge of the plasma, in preparation for the next phase.

The ultimate goal is obviously to obtain a sufficiently dense and well contained plasma, a plasma which is also sufficiently reactive (this means temperatures of 50 to 100 million degrees) so that the thermonuclear power produced in the plasma will reach and then exceed the power lost because of the magnetic configuration of the containment. At that point it is said that the plasma reaches ignition.

Several types of configurations are now under study throughout the world, but there are many laboratories which, like the EURATOM-CEA Association, at the end of the 1960s, began to concentrate their efforts on the method that seemed to be moving fastest toward ignition: the Tokamak process.

At present the Tokamak results can be analyzed as follows:

The containment of the plasma is less than had been expected initially, and it is highly probable that it is dominated by turbulence of a magnetohydrodynamic nature that is hard to apprehend theoretically. However, the diffusion associated with this turbulence has been studied experimentally, and it can be minimized by increasing the volume of the plasma, and thus the size of the containment device, and also by increasing the intensity of the magnetic field used for containment.

The temperature of the plasma can be increased considerably by using supplemental heating methods, as has been demonstrated at Fontenay-aux-Roses and at Grenoble.

On the basis of these results, projects have been designed to demonstrate the ignition of a deuterium-tritium plasma, which is the most easily fusible blend. The large-scale developments needed for this demonstration are the JET (EURATOM), the TFTR (United States), and the JT-60 (Japan) Tokamaks, which are to begin operating in the next few years.

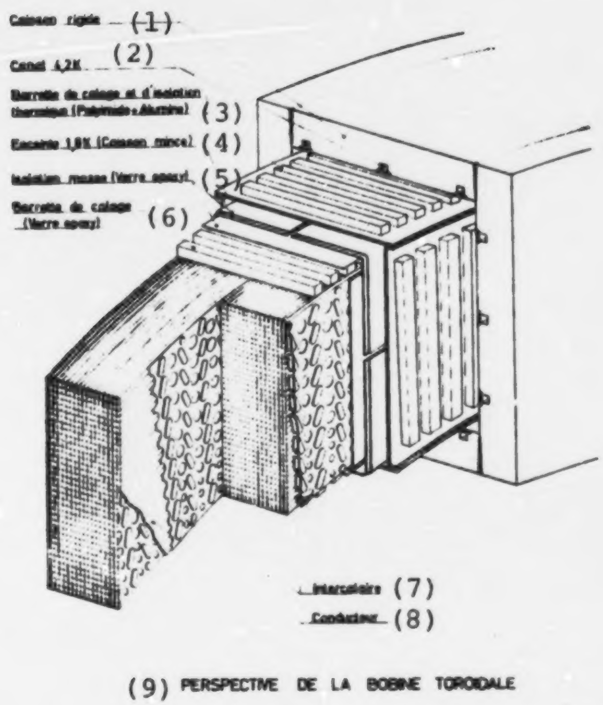
Caisson rigide (1)
Canal 4,2K (2)
Barrette de calage et d'isolation thermique (Polyimide+Alumine) (3)
Enceinte 1,8K (Caisson mince) (4)
Isolation masse (Verre epoxy) (5)
Barrette de calage (Verre epoxy) (6)
Intercalaire (7)
Conducteur (8)
(9) PERSPECTIVE DE LA BOBINE TOROIDALE

Figure 2: Cross section of a superconductor coil of Tore Supra.

Key:

1. Rigid enclosure
2. 4.2 K channel
3. Adjustment and thermal insulation rod (polyamid and aluminum)
4. 1.8 K enclosure (thin casing)
5. Mass insulation (epoxy glass)
6. Adjustment rod (epoxy glass)
7. Spacer
8. Conductor
9. View of toroidal coil

If favorable results are obtained with these Tokamaks, this would open the way toward a prototype thermonuclear reactor. With this in mind, it is necessary to minimize the reactor's energy consumption. This can be done by using superconductor magnets to create the magnetic configuration.

Given this context, the purpose of the Tore Supra, whose size is not sufficient for us to expect to achieve ignition (and in which the use of tritium is not necessary), is twofold. First, it is to build a superconductor magnet, use it in the real environment of a Tokamak and test it in conditions as similar as possible to the conditions of use of a thermonuclear reactor. Secondly, to contribute to the studies of supplemental heating of plasma in Tokamaks under the two fundamental aspects: transfer of power to the plasma and containment of the energy transferred to the plasma.

Tore Supra Description

Although Tore Supra is smaller than the Tokamaks designed for ignition, it does represent an advance over the equipment now being used for experiments. Its characteristics are:

a. large torus radius: 2.25 meters;

b. small plasma radius: 0.70 meter;

c. current in the plasma: 1.7 million amps;

d. magnetic guidance field: 4.5 tes/as.

With these features, it will be possible to produce plasmas with performances rather similar to those of the TFTR or even of the JET. The supplemental heating power will be about 10 megawatts for the plasma, with the possibility of doubling this in a later phase if the results so warrant.

The superconductor magnet creating the magnetic field has 18 coils, whose superconductor material is a niobium-titanium based composite. In order to increase the magnetic field which can be created with this type of material (and thus to agument the performances of the plasma) it was necessary to cool the coils to 1.7 kelvin by using superfluid helium. This combination of superconductivity for the current and superfluidity for cooling is an original solution which, once it has been tested in the Tore Supra, can be directly transposed to the reactor.

The superconductor magnet is placed in a toric cryostat in a vacuum in order to limit the thermal conduction. The internal free space, also of toric shape, forms the chamber housing the plasma, in which a strong vacuum is created. On each side of the toric superconductor magnet, that is, on the side of the cryostat and on the side of the plasma chamber, shields are placed to block the thermal radiation; the shields are cooled to 80 kelvins (see figure 1). Each coil (whose elements are shown in figure 2) is placed in housing cooled to 4.5 kelvins, which provides the conductor it encloses with protection against the rapidly varying fields related to the current of 1.7 million amps induced in the plasma at each discharge.

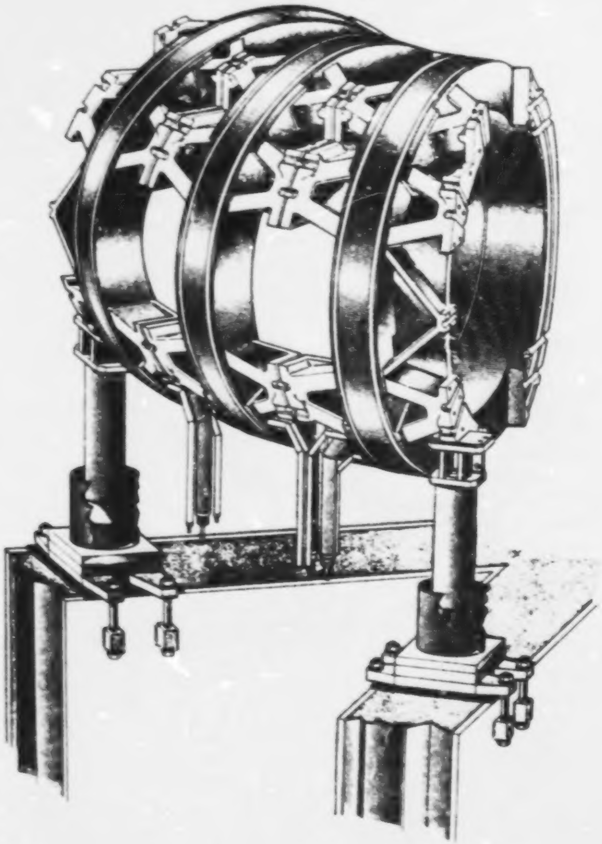

Figure 3: Section of a toroidal magnet.

The 18 coil housings, resting on their side surfaces, form a rigid arch (figure 3 shows a section of this arch) which resists the strong centripetal forces generated.

The cryogenic system associated with the superconductor magnet furnishes fluids at the different temperatures required: superfluid helium at 1.75 kelvin (1 atm) for cooling of the niobium-titanium superconductor; normal helium at 4.2 kelvins for cooling of the rigid housing structures; gaseous helium at 80 kelvins

(15 atm) for cooling of the thermal shields. These cooling powers are respectively: 300 watts, 1 kilowatt, and 40 kilowatts. The equipment was designed in order to minimize consumption at the lowest temperature. The use of large volume tanks serving as thermal ballast makes it possible to enclose the discontinuous operation of Tore Supra: one discharge every 4 minutes.

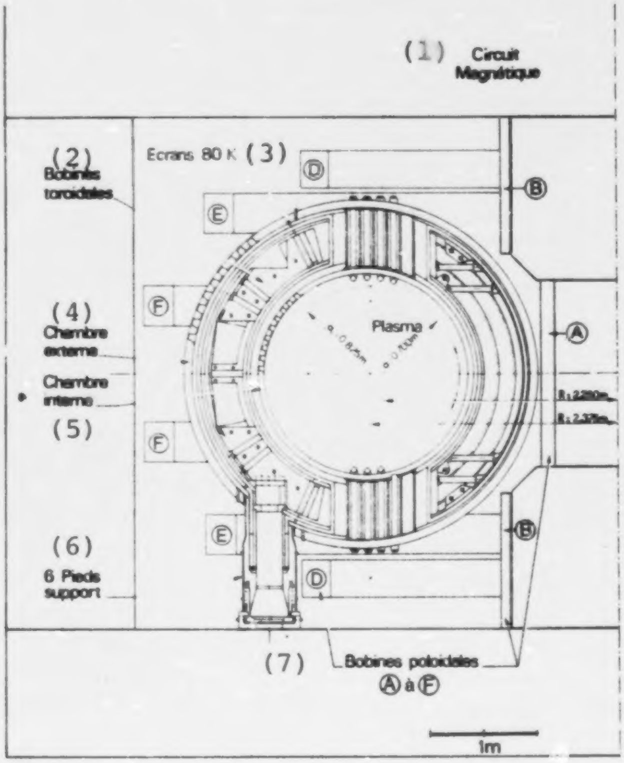
(1) Circuit Magnétique
(2) Bobines toroïdales
Ecrans 80 K (3)
Ⓓ
Ⓑ
Ⓔ
Ⓕ
(4) Chambre externe
Chambre interne
(5)
Plasma
Ⓐ
(6) 6 Pieds support
(7)
Bobines poloïdales Ⓐ à Ⓕ
1m

Figure 4: Poloidal circuit of Tore Supra showing the position of the poloidal coils in relation to the chamber and the plasma.

Key:

1. magnetic circuit
2. toroidal coils
3. 80 K shields
4. external chamber
5. internal chamber
6. six support structures
7. poloidal coils

The transformer inducing the current in the plasma uses an iron magnetic circuit weighing about 800 tons and divided into six arms which meet at the center of the machine. A cross section of one of these arms is given in figure 4. The variation of magnetic flow in this circuit can maintain in the plasma the discharge current of 1.7 million amps for 30 seconds.

The equipment will be formed in six practically identical sections, each with all the elements of the torus, assembled separately before being interconnected to form the torus. Such a module is given in figure 5, showing the various access points planned so that the plasma can be observed, and in order to introduce the heating power in the form of rapid neutron particles and electromagnetic waves.

Site of the Tore Supra Tokamak

The entire staff of the DRFC [Department of Controlled Fusion Research] now working at Fontenay-aux-Roses and at Grenoble will be transferred to the Tore Supra site at Cadarache in the summer of 1986. The facilities there are designed to house, in addition to the equipment needed for the operation of the machine itself, the laboratories which will be used by physicists responsible for designing and developing methods of heating and measurement suitable for the study of thermonuclear plasmas. The development of metrology is an important activity in all thermonuclear fusion laboratories.

The present architectural design of the project is shown in figure 6[not included]. It has great possibilities for expansion, and the floor space already exceeds the areas used at Fontenay and at Grenoble for fusion activities.

The complex containing the machine and its related equipment occupies the central part of the site. Tore Supra will be placed in an area with 1,000 m^2 of usable space, whose 1.5-meter thick walls, made of boron-impregnated concrete, will provide biological protection against gamma radiation and against the neutron flows produced during discharges in a deuterium plasma.

In addition to this area, there will be areas provided for the assembly of modules and other units, for the power supply (supply of the transformer and plasma heating), for cryogenic facilities, and also for the operation of the machine (measurements and controls). Work should start toward mid-1982 and last until the summer of 1985.

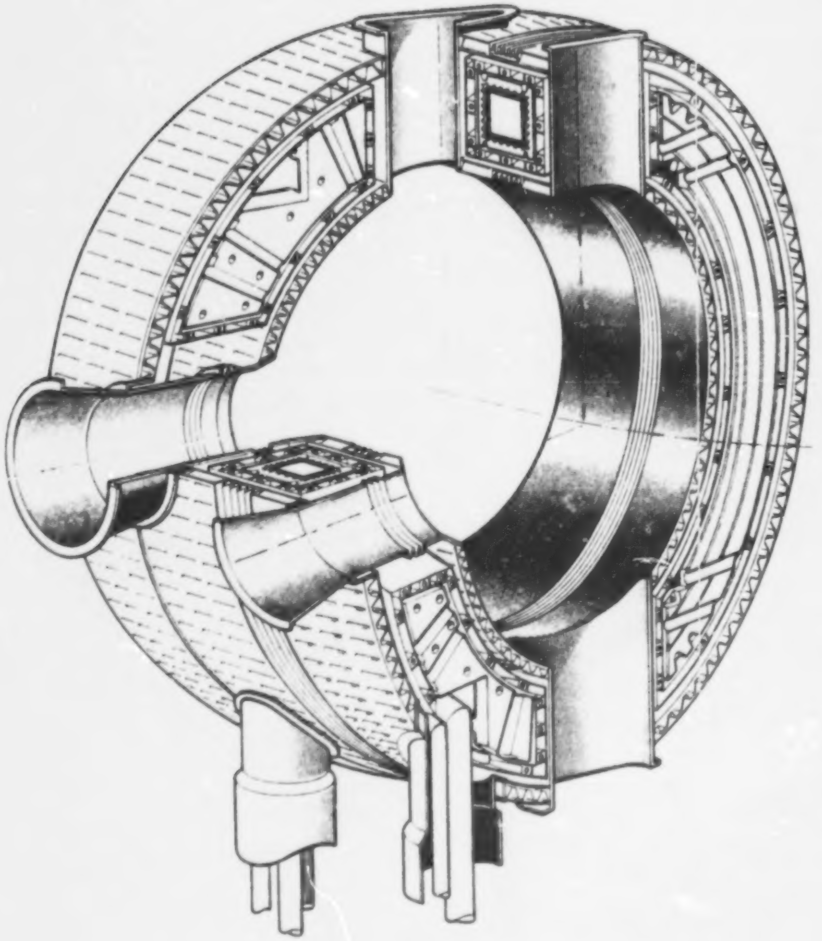

Figure 5: Cross section of a portion of a vacuum chamber equipped with thermal shields and toroidal field coils.

The Thermonuclear Reactor and the Energy Problem

In the future the world's energy needs will be so great that serious studies will have to be made of the various potential sources of energy. At the present time, nuclear energy seems to be the only source that could meet Europe's needs in the mid-term period. However, given the magnitude of the energy problem, fission and fusion* should be considered as two complementary systems, not competitive methods. Fission research has shown that breeder reactors could form the base for tomorrow's electric power plants. At present fusion is in a very preliminary phase of development, but in the long term, it does offer a certain number of potential advantages. One advantage is that the products of fusion reaction are not radioactive, unlike fission products. Also, the quantity of fuel in reaction at each instant is low, which eliminates the risk of accidental racing. However, there is cause for some concern about the irradiation of the materials of the reactor structure, and about problems related to tritium, which will be present in a very large quantity. As for the deuterium and lithium supplies--these are the main fuels of the D-T reactor--the known reserves of high quality lithium have an energy content comparable to that of the world's reserves of uranium and thorium. Lithium could also be extracted from sea water or from low quality ores which are present in many parts of the world. Deuterium resserves are virtually inexhaustible.

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* Fusion. The fusion process is based on the bonding energy released by the fusion (or combining) of light nuclei; this reaction produces a heavier nucleus. There are several types of fusion reactions involving light elements. The one that furnishes the greatest amount of energy and has the least stringent conditions, and thus the one that is of greatest interest, takes place between two types of hydrogen (isotopes): deuterium (D) and tritium (T). These two elements combine to produce a helium nucleus (^4He) which is heavier and a neutron (n), ($D + T \longrightarrow {}^4He + n + energy$). Moreover, during this phenomenon a great amount of energy is released which can be converted, first into heat in a peripheral moderating mantle, and then into electricity by means of conventional generators. Deuterium, which is found in water, is quite plentiful. Tritium, however, does not exist in nature and must be produced. Tritium can be produced in a lithium mantle surrounding the region of fusion. The neutrons created by the deuterium/tritium reaction are then captured by the lithium which disappears, and is replaced by tritium and helium.

Although it is very difficult, not to say dangerous, to risk a prediction about when there will be thermonuclear reactors producing electricity, we can imagine that a first demonstration reactor might be built during the period from 2000 to 2010. Then the first semi-industrial reactor might be ready during the period from 2020 to 2030.

Based on these assumptions, it will be about half a century before the first electricity-generating fusion reactors could technically be of any significance in terms of producing electricity.

The way seems promising and could provide our energy needs for several centuries. The research programs, the work being done, and the large funding being provided in all the major industrialized countries all show the importance of fusion.

7679
CSO: 5100/2172

BRIEFS

PARIS REPORTS NO CONFIRMATION--A new French nuclear test in Muroroa atoll in the Pacific was announced by the Government of New Zealand, but to date the information has not been confirmed in Paris. For several years now the French authorities have ceased to comment on this kind of experiment. The New Zealanders, very hostile to these nuclear tests, point out that the strength of the explosion was 20 kilotons more powerful than the first test this year on 21 March, Coincidence or not, this explosion took place at the very moment when French vulcanologist Haroun Tazieff was expected to arrive in Wellington, the New Zealand capital. Tazieff has been entrusted with a mission by the French Government on the consequences of the nuclear experiments in the Pacific on the environment. [Excerpt] [LD031240 Paris Domestic Service in French 1100 GMT 3 Jul 82]

CSO: 5100/2212

END

JPRS 81458

5 August 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 155

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JPRS 81458

5 August 1982

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 155

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BANGLADESH

BRIEFS

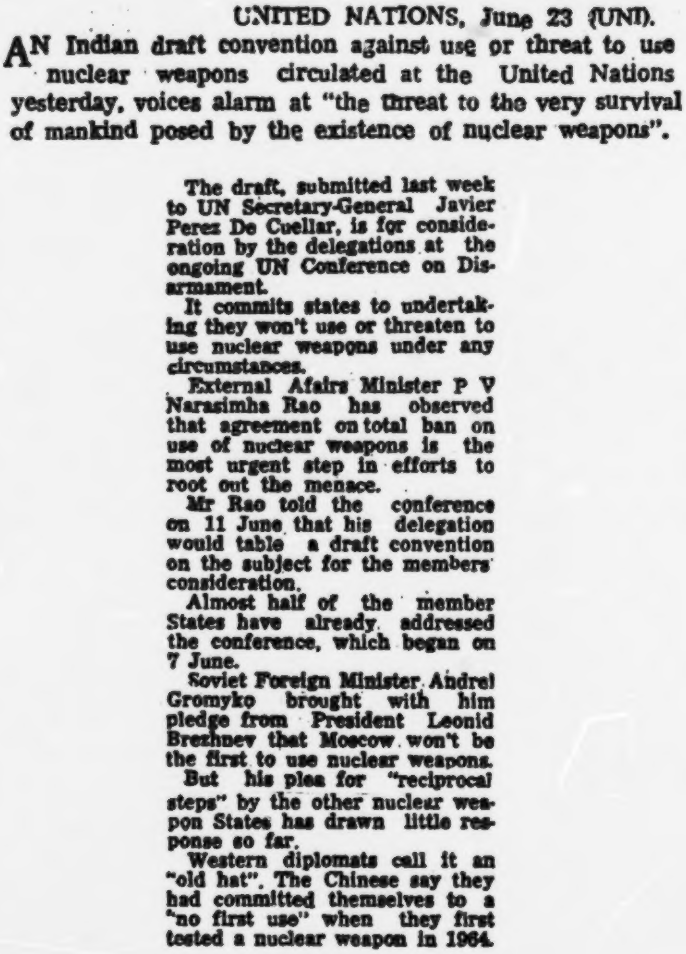
NUCLEAR NONPROLIFERATION TREATY--An agreement was signed between Bangladesh and International Atomic Energy Agency (IAEA) for the application of safeguards in connection with the Treaty on Non-proliferation of Nuclear weapons (NFI) in Vienna on June 11 last, an official handout said in Dacca on Saturday, reports BSS. The Chairman of the Bangladesh Atomic Energy Commission, Dr. Anwar Hossain, and the Director General of the International Atomic Energy (IAEA), Dr. Hans Blix, signed the agreement. The agreement was approved by the IAEA's Board of Governors on February 24 last and was negotiated with Bangladesh after she acceded to NPT on September 1979. At present 117 states are party to the Treaty. [Text] [Dacca THE BANGLADESH TIMES in English 20 Jun 82 p 1]

CSO: 5100/7115

DRAFT CONVENTION CIRCULATED AT UNITED NATIONS

New Delhi PATRIOT in English 24 Jun 82 p 3

[Text]



UNITED NATIONS, June 23 (UNI).

AN Indian draft convention against use or threat to use nuclear weapons circulated at the United Nations yesterday, voices alarm at "the threat to the very survival of mankind posed by the existence of nuclear weapons".

The draft, submitted last week to UN Secretary-General Javier Perez De Cuellar, is for consideration by the delegations at the ongoing UN Conference on Disarmament.

It commits states to undertaking they won't use or threaten to use nuclear weapons under any circumstances.

External Afairs Minister P V Narasimha Rao has observed that agreement on total ban on use of nuclear weapons is the most urgent step in efforts to root out the menace.

Mr Rao told the conference on 11 June that his delegation would table a draft convention on the subject for the members consideration.

Almost half of the member States have already addressed the conference, which began on 7 June.

Soviet Foreign Minister Andrei Gromyko brought with him pledge from President Leonid Brezhnev that Moscow won't be the first to use nuclear weapons.

But his plea for "reciprocal steps" by the other nuclear weapon States has drawn little response so far.

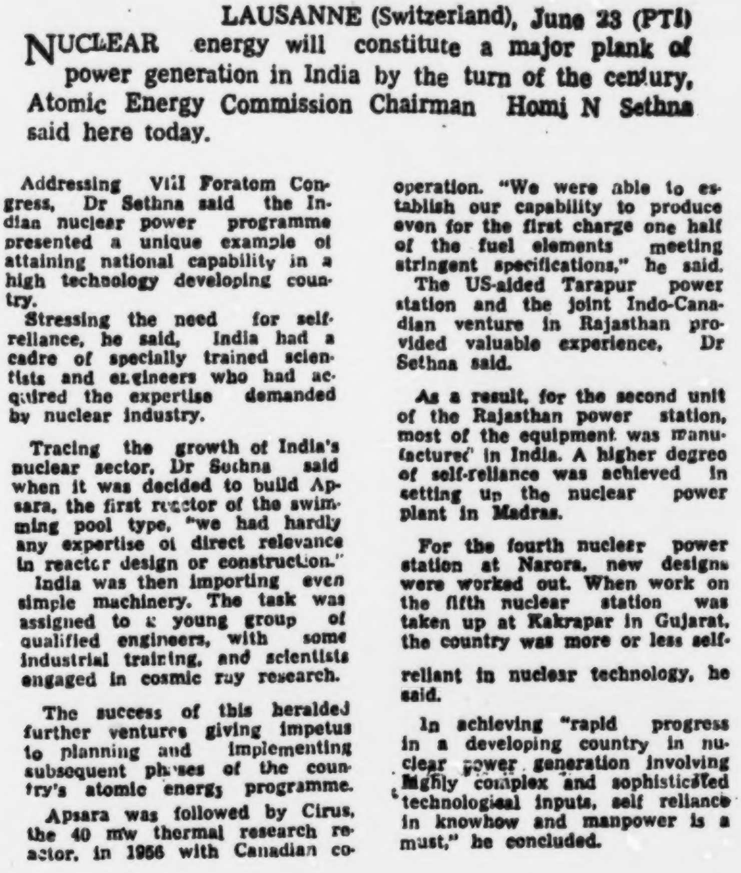
Western diplomats call it an "old hat". The Chinese say they had committed themselves to a "no first use" when they first tested a nuclear weapon in 1964.

CSO: 5100/7114

AEC CHAIRMAN SETHNA SPEAKS AT LAUSANNE MEETING

New Delhi PATRIOT in English 24 Jun 82 p 7

[Text]



LAUSANNE (Switzerland), June 23 (PTI)

NUCLEAR energy will constitute a major plank of power generation in India by the turn of the century, Atomic Energy Commission Chairman Homi N Sethna said here today.

Addressing VIII Foratom Congress, Dr Sethna said the Indian nuclear power programme presented a unique example of attaining national capability in a high technology developing country.

Stressing the need for self-reliance, he said, India had a cadre of specially trained scientists and engineers who had acquired the expertise demanded by nuclear industry.

Tracing the growth of India's nuclear sector, Dr Sethna said when it was decided to build Apsara, the first reactor of the swimming pool type, "we had hardly any expertise of direct relevance in reactor design or construction."

India was then importing even simple machinery. The task was assigned to a young group of qualified engineers, with some industrial training, and scientists engaged in cosmic ray research.

The success of this heralded further ventures giving impetus to planning and implementing subsequent phases of the country's atomic energy programme.

Apsara was followed by Cirus, the 40 mw thermal research reactor, in 1956 with Canadian cooperation. "We were able to establish our capability to produce even for the first charge one half of the fuel elements meeting stringent specifications," he said.

The US-aided Tarapur power station and the joint Indo-Canadian venture in Rajasthan provided valuable experience, Dr Sethna said.

As a result, for the second unit of the Rajasthan power station, most of the equipment was manufactured in India. A higher degree of self-reliance was achieved in setting up the nuclear power plant in Madras.

For the fourth nuclear power station at Narora, new designs were worked out. When work on the fifth nuclear station was taken up at Kakrapar in Gujarat, the country was more or less self-reliant in nuclear technology, he said.

In achieving "rapid progress in a developing country in nuclear power generation involving highly complex and sophisticated technological inputs, self reliance in knowhow and manpower is a must," he concluded.

CSO: 5100/7114

FOREIGN MINISTER DEFENDS COUNTRY'S NUCLEAR DEVELOPMENT PROGRAM

Karachi JANG in Urdu, 31 May 82, p 3

[Text] The foreign minister Sahabzada Mohammed Yaqub Khan said that Pakistan has always been against the proliferation of nuclear weapons and is engaged in lessening the world tension and has informed the International Atomic Energy [IAEA] about the peaceful nature of its nuclear program. He said that Pakistan will emphasize the need of securities for non-nuclear countries. In this regard he referred to Pakistan's efforts in declaring South Asia and Indian Ocean as a nuclear-free zone. At the Islamabad airport, while departing for non-aligned countries' congress in Havana, Mr Yaqub Khan extolled the virtues of nonalignment and said that Pakistan adhered to those virtues.

Pakistan has been pursuing the policy regarding the nuclear weapons which the foreign minister spoke about for many years. Ever since Pakistan has undertaken nuclear development it has been her stand that nuclear energy should be developed as a fuel resource, because Pakistan does not have alternative resources for fuel. It can satisfy increasing demand for fuel only through nuclear energy. The biggest proof of this policy, all accusations notwithstanding, is that Pakistan has not undertaken even a small nuclear explosion. There have been a lot of conspiracies against Pakistan's nuclear program in the past. From Washington to London, in all forms of media, there have been all kinds of accusations--including the stealing of nuclear instruments from international organizations. Zionist and Indian lobbies, to frighten the world, branded the so-called Pakistan's atom bomb as an "Islamic bomb" and connected it with Libyan economic resources.

In this regard the most deplorable attitude has been adopted by India which, not only has had one explosion but is engaged in preparations for another explosion and is not willing to let its nuclear installations be inspected by the IAEA. It also opposes the declaration of Indian Ocean and South Asia as nuclear-free zone and in addition, accuses Pakistan of making an "Islamic" nuclear bomb. India has been helped most in this regard by the attitude of the United States and France, since the former President Carter, without making a due check, had put an embargo on U.S. aid to Pakistan and, at Carter's bidding, the former French President Giscard d'Estaing refused to sell Pakistan the nuclear reprocessing plant. Pakistan faced these conditions bravely; the present American government was finally convinced of its sincerity and announced the restoration of U.S. aid.

But recently activity in the Senate Foreign Relations Committee has made it clear that Indian and Zionist lobby is still fully active against Pakistan. The biggest propaganda tool it has is that Pakistan is about to manufacture a nuclear bomb. Although this matter is for the time being resolved in the foreign relations committee, it is yet to be discussed in both the Senate and the House of Representatives. Therefore Pakistan should brace itself to face its enemies in both chambers. The foreign minister, Mr Yaqub Khan has said something very important in this regard, that Pakistan has informed the IAEA of the peaceful nature of its nuclear program. He also stressed on the security for non-nuclear nations and declaration of South Asia and the Indian Ocean as nuclear-free zone. In our opinion, Pakistan should demand through nonaligned nations, the UN and the Organization of Islamic Conference at various levels that the countries putting obstacles in the way of declaring South Asia and Indian Ocean as a nuclear-free zone should be condemned.

Pakistan should express its stand vociferously. This matter should be stated before the visiting dignitaries so that it may be included in the joint communiques and may be helpful in mobilizing world opinion in Pakistan's favor.

9859
CSO: 5100/5761

MINISTRY OFFICIAL DENIES KNOWLEDGE OF BECHTEL OFFER

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 6 Jul 82 p 34

[Text] Dario Gomes, adviser to the Ministry of Mines and Energy on Nuclear Affairs, said yesterday that he is completely unaware that Bechtel, a company headed by George Shultz until his nomination to the U.S. Department of State, had proposed to the Brazilian Government the construction of a uranium enrichment plant in the Amazon jungle in 1975.

Gomes declared that the report from the United States, published yesterday by the Carioca newspaper, "is very odd because up to now the Brazilian Government has not discovered uranium in Amazonas and in 1975 it did not yet have knowledge of the uranium reserve of Itataia in Ceara."

He also considered the report odd because in 1975 the U.S. Government was the greatest opponent of the Brazilian nuclear program. He also recalls that at that time President Ernesto Geisel denounced the Brazil-U.S. military agreement because of the pressures President Jimmy Carter put on Brazil to freeze the agreement signed with Germany which stipulated the construction of eight nuclear powerplants in Brazil and the transfer of German fuel technology.

Gomes did not accept the possibility that the Bechtel Corporation may have discovered the existence of uranium mines in the Amazon jungle. He said, however, that he does not mean to say that there is no uranium in that region: "I only assert that the Brazilian Government has not yet found that mineral in that region," he said, "and that NUCLEBRAS [Brazilian Nuclear Corporation] is involved in no activity there. It may be that the mineral exists, even because it is mixed in the soil with other minerals."

The largest deposits of gold, such as Tapajos and Serra Pelada, emeralds, rare metals, cassiterite and diamonds are concentrated in the Amazon Region.

8908
CSO: 5100/2210

ARGENTINE, NATIONAL NUCLEAR BOMB POSSIBILITIES DISCUSSED

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 6 Jul 82 p 2

[Article by Jose Goldemberg: "Brazil, Argentina and Atomic Bombs"]

[Text] It was a surprise for many that the Argentine military did not threaten to resort to atomic weapons as a means of pressure against the British during the Malvinas War. It is very true that neither the Malvina Islands nor the British fleet were suitable targets for the employment of nuclear weapons but Argentine domestic moral would have been greatly strengthened by a show of force through the explosion of a nuclear device in a remote region of Patagonia.

Something similar was done by the Indians in 1974; the detonation of their first atomic bomb, which they still euphemistically call an "explosion for peaceful purposes."

In the Argentine case, this demonstration of force and advanced technology would not only serve for domestic purposes but also for acquiring greater respect abroad and, therefore, better negotiating conditions with the British.

The fact that it did not happen shows that the Argentines are not yet ready to make nuclear weapons, or that the situation was not considered extreme enough for going that far by their leaders.

From a technical point of view, the Argentine option in the nuclear area is similar to that of India, that is, the use of natural uranium, it being therefore only a question of time for its capabilities to produce nuclear weapons regardless of outside pressure. This choice was made in the decade of the '50s and the Argentine nuclear program was always oriented toward using and developing local technology. Even during the worst periods of political repression in the universities, the technical personnel of the Argentine National Atomic Energy Commission (CNEA) were preserved (minus some exceptions), and Admiral Castro Madero, president of the CNEA, was very effective in protecting his personnel.

Since the natural uranium line is free of the oversight of the IAEA (because it did not sign the Nuclear Nonproliferation Treaty), Argentina may produce plutonium, purify it and make low-yield atomic bombs such as those of Hiroshima and Nagasaki, but even so, very powerful. It is known that Argentina has uranium reprocessing pilot plants for the production of plutonium, which should be sufficient for some bombs. Five kilos of plutonium are enough to make one of them.

It is possible that the construction of the bombs may have presented some problems but there is enough literature available in that respect. With the reasonable technological base that Argentina has, it should be possible to repeat what the Indians did.

It is possible that the Malvinas War took place too early, before the Argentine technicians finished their work, but with the defeat they will probably be encouraged to complete it as a weapon to be used to assuage the wounded pride of the nation and to improve its negotiating position.

This appears to be the most probable hypothesis; the other is that the bombs do exist and a political decision was made not to use them. This is what is presently happening with Israel, which certainly--in our opinion--has bombs made with the natural uranium reactor of Dimona, which is free of international oversight. The Israelies would probably only use atomic bombs to prevent the destruction of the state of Israel, which is not about to happen soon. Many believe that Israel would do it against Asswan or Cairo in 1973 if they did not manage to halt the military advance of the Egyptians.

Whatever the situation may be in Argentina with respect to nuclear weapons (temporary technical difficulties or political decisions), it places Brazil in an uncomfortable position.

The technological choice by Brazil (made during the administration of Costa e Silva in 1969 and intensified even more by the Geisel government in 1975) is that of using enriched uranium, which the country does not produce and will not be able to produce within the foreseeable future. Even if the machines that are being developed in Germany for the employment of the "centrifugal jet" method were to work, they only enrich uranium to a degree that does not allow the construction of nuclear bombs. Moreover, Brazil, despite the fact that like Argentina it did not sign the nonproliferation treaty, signed so many inspection agreements with the international agency that in practice the freedom of the country in this area is purely rhetorical.

Unless it is by means of a "parallel nuclear program," of which nothing is known, it is not possible for Brazil to compete with Argentina in this area. This is the high price to which the line of technological dependence in the nuclear area of the governments of Costa e Silva and Geisel led us. The lack of confidence in the national capability and the obtainment of sealed (and doubtful) technological packages in Germany led us in 1982 to a worse dependence than the one we had 15 years ago when the embryo of an independent nuclear program with the support and participation of our scientists, was first seen in the country.

If Argentine were to "surprise" us with the explosion of a "peaceful" nuclear bomb in the near future, the weakness of the Brazilian strategic position would be exposed with all clarity.

Technological independence, always advocated by Brazilian scientists and industrial groups, also has within it the seeds of military independence; both were lost in the last 15 years.

8908
CSO: 5100/2210

URANIUM REPROCESSING PLANT CONSTRUCTION TO BEGIN IN 1983

Rio de Janeiro O GLOBO in Portuguese 2 Jul 82 p 17

[Text] NUCLEBRAS [Brazilian Nuclear Corporation] President Paulo Nogueira Batista announced yesterday at the War College [ESG] that construction of the uranium reprocessing plant--the most important phase in the cycle of that fuel which allows the obtention of plutonium--will begin next year and that it will go into operation in 1988.

Shortly afterward, in an interview, he reported that several studies exist on the location of the plant, although he could not reveal the sites researched. Faced with the insistence of reporters, he admitted the plant will be near the ocean.

Basic Project

Nogueira Batista said the country already has the complete basic project for the reprocessing plant and the execution of the detailed engineering is fully underway.

"We shall acquire competence, not only for managing the implantation of the undertaking but also for planning similar installations of an industrial scope in the future," he added.

To the president of NUCLEBRAS, the delay of 4 years in the construction of the Angra 1 and Angra 2 powerplants concluded by becoming a favorable factor. It was possible to make an adjustment in the Nuclear Program and to establish a more suitable cadence in the installations of the plans and other undertakings.

The participation of NUCLEP [NUCLEBRAS Heavy Equipment, Inc.] and of the Fuel Element Factory may be substantially increased, transferring to Brazil services heretofore stipulated to be performed in Germany. The national share in the fabrication of heavy equipment for the Steam Generation Nuclear System (SNGP) for the two powerplants to be built in Iguape, Sao Paulo, was also increased from 70 percent to 100 percent. It also became possible to renegotiate the already existing contract with the KWU on the supply of initial fuel loads for Angra 2 and Angra 3, loads which now become almost entirely the responsibility of the Fuel Element Factory.

"In similar fashion, in the area of uranium enrichment, delays in the nuclear powerplant program provided the opportunity for a revision of the original plan for the construction of a 200,000 Separative Work Units per year plant initially scheduled for operation in 1983. The results obtained in separation elements technology allowed, because of the extension of the timetable, the incorporation of considerable improvements in the process."

The president of NUCLEBRAS pointed out that Brazil will have the capability of enriching uranium industrially as of 1986 at the level of 60,000 kilos, capacity which will be increased as of 1988 to nearly 300,000 kilos. This capacity will take care of national demand up to 1995, when the new isotopic separation plant will go into operation.

Jet Nozzle Process

On the jet nozzle process already adopted for the plants of the Nuclear Program, Paulo Nogueira Batista said that it can be competitive due to the improvements introduced. However, if it were to be uncompetitive, the government is ready to pay the expense, because what is important is the assimilation of technology. He explained that the jet nozzle process is the intermediate process between gaseous diffusion and centrifuge technology.

Nogueira Batista said the Nuclear Program is now progressing at a normal cadence with the goal of a powerplant every 2 years instead of the installation of one unit per year.

8908
CSO: 5100/2210

SBPC SCORES CTA NUCLEAR RESEARCH FOR MILITARY PURPOSES; REACTION

Scientists Condemn Bomb-Making

Sao Paulo FOLHA DE SAO PAULO in Portuguese 9 Jul 82 p 26

[Text] "The scientific community must not go along with any attempt to develop devices, in any type of institution, whose ultimate purpose will be the destruction of human lives," declared the geneticist Crodowaldo Pavan yesterday afternoon in Campinas; he is president of the SBPC (Brazilian Society for the Advancement of Science) and he was commenting on a story published in FOLHA, reporting the existence, in Sao Jose dos Campos, of a laboratory which is directed by military personnel and which is conducting nuclear experiments that may be the embryo of the Brazilian atomic bomb.

Pavan said that it is difficult immediately to adopt a position because there is no certainty whether the atomic bomb would be made; but he maintained that the government must clarify the issue. According to him, the creation of institutes promoting higher studies--such as the Institute of Advanced Studies at the Aerospace Technical Center--basically is an idea that deserves the support of scientists, "especially if they are created or promoted not only in Sao Jose dos Campos but also at the universities."

"But," he pointed out, "if this effort is headed toward military uses, then it has and will have our total disapproval since this is the generalized trend of thinking in the university community."

Other scientists who were questioned expressed their concern with the use of scholarships for research and stated their opposition to the development of nuclear research in military installations. They emphasized that the participation of university researchers in this effort is a negative thing and they were particularly irritated over the fact that scholarships intended for research on armaments show up in the budgets as a part of the total amount earmarked by the administration for the development of science and technology.

"If you were to decide to grant a scholarship for research for which a physicist from a university and a military man from a center such as the CTA [Aerospace Technology Center] or the Military Engineering Institute were to compete, to whom would you award the scholarship in the country's current situation?" asked leaders of the Brazilian Physics Society with a note of irony.

Physicist Enio Candotti, a professor at the Physics Institute of the Federal University of Rio de Janeiro and editor of the magazine CIENCIA HOJE, put out by the SBPC, did not spare his criticism of nuclear research at the CTA , especially because this research is being done with the support of scientists from traditional academic institutions.

I am personally opposed to the development of technology for the manufacture of the bomb but I suppose I might even accept this sort of thing if it were to be decided by the nation in a democratic fashion, through the proper channels, such as parliament, subject to social control. But so long as the military will not return to the barracks, one cannot accept any collaboration between the scientific community and institutions that develop programs that can have military applications," he said.

Physicist Rogerio Cerqueira Leite will coordinate the symposium on the allocation funds for research aimed at military applications this coming Monday; he explained that "The point of agreement among opinions held by the scientific community as of this moment is represented by concern over the use of funds which should be earmarked for research at academic centers but which instead are supposed to go to military laboratories."

Cerqueira Leite agreed that, in the current stage, pursuing manufacture through plutonium (which can be obtained from uranium used in commercial, small-size or experimental reactors), Brazil would be in a position to develop nuclear weapons in 2, 3, or at most 5 years. Using uranium (which requires enrichment) however, the cost of developing a military nuclear program would be higher and would at least take twice as long.

He did not wish to say anything about the positions that might be taken during the debate among scientists next Monday but admitted that proposals from the pacifist group might be possible.

"I believe that there is unanimous rejection of the idea of awarding scholarships from the National Scientific and Technological Development Fund for military research," he said.

In conclusion, Cerqueira Leite argued that the cooperation of the scientific community is indispensable at this time so that the military laboratories may develop nuclear arms. "It is not possible for this development to be accomplished without the aid of civilian scientists, at least for now."

Physicists Examine Commission Report

The board of directors and the council of the SBF (Brazilian Physics Society) will today examine the documentation collected throughout the year by the commission of three specialists appointed at the 33rd annual meeting of the SBPC, held in Salvador last year; it will be their job to evaluate the situation regarding funds allocated for research with military purposes in mind. The commission is made up of professors Jose Antonio de Freitas Pacheco, of the National Observatory (a specialist in aerospace science), Sergio Machado Rezende, of the Federal University of Perambuco (a specialist in electronics and data processing), and Solange May de Barros, of the Federal University of Rio de Janeiro (a specialist in electronic accelerators).

The organization's leaders will decide whether they will make the document official and disclose it; this is the document whose general content is to be released to the public Monday afternoon during the symposium on fund allocations for research aimed at military purposes; this meeting will be attended by the commission members under the coordination of the physicist Rogerio Cerqueira Leite.

The commission was established as the result of a proposal signed during the SBF meeting by professors Luis Pinguelli Rosa, currently president of ANDES (National Association of Higher Education Lecturers), and Moises Nussenweig, currently president of the SBF; both of them are worried over the growing volume of scholarships allocated for military research.

Concerning the survey conducted by the three specialists, it was learned that it is not confined to an examination of action at the CTA but covers all military scientific-research laboratories.

The story published by FOLHA concerning the installation, about a year ago, of the current IEA (Institute of Advanced Studies), which has been integrated into the CTA, was amply confirmed by all scientists contacted yesterday and, by some strange coincidence, one of the symposiums held on the first day of the scientific meeting at Campinas, on "Scientific Instruments and Accelerators," coordinated by Professor John D. Ropgers, of the State University of Campinas, was attended by one of the officials responsible for the project being developed at the CTA, Professor Trentino Polga, a former director collaborator of the physicist Oscar Sala in building the Van Der Graff heavy-ion accelerator at the Physics Institute of USP [University of Sao Paulo). The title of the study contributed by Professor Polga at the symposium was "The Project for Adavanced Study Laboratories of the CTA for a Linear Electron Accelerator"; this equipment is necessary to calculate the critical mass and to determine the physics of fission materials (electron shock section which is of interest in the production of nuclear weapons).

According to physicist Enio Candotti, "Until such time as scientists on the level and with the competence of Professor Polga started working at the IEA, there was no reason for concern; technicians of military origin certainly would never manage to develop the bomb. But with the team which is at Sao Jose dos Campos now, there is reason for worry. He (Polga) knows what to do and can assemble an efficient team."

According to the report from the scientists who witnessed the presentation by Professor Polga (the symposium was also attended by professors Roberto Logo and the former president of the SBPC, Oscar Sala, both of whom presented reports), the scientist admitted that the team now at work at the IEA "has no knowledge as to where the scholarships used in research come from."

"We only ask them (the military) and they either give us or do not give us the scholarship," said the scientist when questioned by his colleagues.

Danger of Fragmentation

Placing research of a strategic nature,such as nuclear research, within closed facilities, such as military research laboratories, where access to information is classified, is something which the coordinator of the postgraduate sector of the Physics Institute of Unicamp [University of Campinas], Professor Jose Carlos Valadao de Matos, is not desirable, to say the very least.

"Working in these laboratories, you can become involved in undesirable things, even without knowing it, as happened in the well-known Manhattan Project which developed the first American atomic bombs that were dropped on Hiroshima and Nagasaki. It is perfectly possible for the technological development of a device to be so broken up and compartmentalized that the researcher will not know to what use his work is going to be put. It is only necessary for somebody with the proper competence to assemble the pieces and, for example, to come up with the bomb, without those involved getting the big picture," he added.

Valadao de Matos recalled that there is no justification for the tremendous flow of capital and funds for equipment supplied to institutions, such as the IEA of the CTA for technological research, "even if this is research for peaceful purposes since the scientific community at this time is suffering from considerable budget cuts."

No Comments from Nuclear Power Establishments

"I am not a military man," was the response of NUCLEBRAS [Brazilian Nuclear Corporation] president Paulo Nogueira Batista as he denied yesterday in Rio that he had any knowledge of nuclear research conducted at the CTA at Sao Jose dos Campos, which is connected to the Ministry of Aeronautics whose objectives were viewed with suspicion at the annual meeting of the SBPC held in Campinas.

"NUCLEBRAS is not participating in CTA research," said Nogueira Batista, "since it is only responsible for the execution of the nuclear program based on the agreement with West Germany which calls for the installation of plants and the complete fuel cycle in Brazil."

Nuclear Energy Commission

Hervasio de Carvalho, chairman of the CNEN (National Nuclear Energy Commission) likewise in Rio refused to talk about the matter, saying only that the agency has an agreement with university research institutes concerning the training of technical personnel. As for the Data Cyber 170/750 computer, installed at the CTA, which will have terminals at the CNEN for the exchange of information, Hervasio de Carvalho confined himself to saying that the agency does not need other computers since it already has its own.

The scientists believe that it is the goal of CTA to build fast [breeder] reactors which run on plutonium and which can produce fuel when they operate. In May of last year an agreement was signed in Italy for the development of fast breeders in Brazil as part of the continuation of the cooperation accord signed in 1971; this agreement is intended, for a period of 3 years, to provide funds on the order of $3 million per year.

This program was placed under the responsibility of CNEN and will be developed on the basis of the initial experience of the Nuclear Engineering Institute connected with it. Italy is already participating in the French program, which is more advanced, to the extent of 40 percent; a 1,200-Mw nuclear power plant--the Super Phenix--is already under construction in France.

The goal, by the end of those 3 years, is the training of personnel in Italy and in Brazil in sodium technology, in safety criteria, and reactor physics, theory, and experimentation, plus the assembly of the infrastructure, installations, and circuits for experiments in the field of sodium technology and the physics of the core of fast breeders. More detailed guidelines will be drawn up for the continuation of the program throughout this entire period of time.

Criticisms

The possibility that Brazil might make the atomic bomb on the basis of work being done by the IEA at the CTA was considered yesterday in Brasilia by Deputy Freitas Diniz, of the PT [Labor Party] as "serious primarily because of the secrecy surrounding it."

"By virtue of its implications, a program of this kind and size should be started only after a broad nationwide debate, including in Congress," the PT member of parliament emphased; he then added that "Anybody who has plutonium with the purity and in the quantity required for laboratory work to promote the development of the technology that will permit the construction of fast breeders obviously has fissile material in sufficient quantity to explode dozens of Hiroshima-type atomic bombs."

Freitas Diniz--who was one of the few members of parliament to participate in the debates on the Brazilian-German nuclear agreement--recalled that NUCLEBRAS is in a position by virtue of this agreement to produce plutonium in the near future but, because of the system of safeguards, it will not be able to use it for military purposes.

Minister Denies Atomic Bomb Effort

Rio de Janeiro JORNAL DO BRASIL in Portuguese 13 Jul 82 p 17

[Text] Navy Minister Maximiano da Fonseca said yesterday in Rio that Brazil is not thinking of using money for the purpose of making atomic bombs and denied the existence of an arms race in the country. As for the reequipment of the Navy, the minister commented that this undertaking is moving with a tailwind, "a rather slight wind, but it is moving, in keeping with the country's possibilities since the country is facing many difficulties now."

In Brasilia, Gen Alacyr Frederico Werner, the chief of the EMFA [Armed Forces General Staff] with the rank of minister said that "Brazilian policy is aimed at the utilization of nuclear energy only for peaceful purposes." This was the only comment he made on this matter.

Difficulties

Admiral Maximiano in the morning attended the muster of the second group of officers of the Women's Reserve Auxiliary Corps. After the ceremony, he gave an interview during which he talked not only about the question of nuclear weapons but also about the November elections.

At first he said that he was not familiar with the charges made during the meeting of the SBPC concerning the diversion of scholarships for arms research.

"We are having tremendous trouble getting money for weapons research. The Navy is not getting any money other than what is allocated for armaments."

The question as to the existence of an arms race in Brazil produced an attitude of surprise in the navy minister.

"An arms race, here? Do you think that exporting is an arms race? If a country needs foreign exchange and jobs, would you say that you have an arms race when you employ 250 people at a factory which was opened last week for export purposes. Anybody who wants to buy can buy; anybody who does not want to buy does not have to buy."

The minister talked about the Navy's budget and the development that is being pursued with it.

"Does that mean that the Navy's reequipment is moving with a tailwind?"

"It is moving, with a slight wind, but it is moving. It will not stop. It goes along with the possibilities of the country which is having many problems and difficulties but it will continue and it will not stop."

"Will the Navy invest in atomic arms?"

"Of course not. Brazil is not thinking of spending money on atomic weapons. Missiles, yes. If we had money, we would buy more missiles. We do have missiles, including the famous Exocet, but we need more."

The minister commented as follows on the election campaign and the calm climate: "Until a short time ago, newsmen were asking whether there would be any elections. They have stopped asking that question because they are sure that we are going to have elections. I am sure that the calm climate will continue. Only if somebody wants to create trouble for instance by preaching revolution as in the case of an individual whom I do not even want to talk about [faded photostat]. If there is agitation, it will come from those who want to make trouble for some other reason."

The minister also added that "If there is going to be an election, somebody is bound to win and somebody is bound to lose and some people are poor losers."

At the SBPC

"There is no evidence that nuclear devices are being manufactured in Brazil," said physicist Sergio Machado Rezende, of the Federal University of Pernambuco, yesterday in Sao Paulo; he is one of the persons charged by SPBC with analyzing the allocation of funds for research for military purposes.

In attending the symposium held to discuss this matter, Professor Machado Rezende announced that, although this figure cannot be confirmed officially, it is calculated that 500 billion cruzeiros are being spent on this type of research in Brazil.

Foreign Office Denies Military Objective

Brasilia--Foreign Relations Ministry spokesman Bernardo Pericas [faded photostat] said yesterday that Itamarati [Foreign Office] "does not know of any nuclear program for military purposes which is being developed in Brazil." According to him, there is a Brazilian government policy decision not to produce military devices employing nuclear energy.

The statement was made in response to charges by physicists at the University of Campinas yesterday during the symposium on fund allocations for military research promoted by the SBF. The symposium is a part of the official program for the 34th annual meeting of the SBPC.

Technicians at the GLB Watahin Physics Institute at Unicamp revealed that the IEA of the GTA in Sao Jose dos Campos will spend about 400 billion cruzeiros over a period of about 8 years on the development of research on nuclear energy for military purposes.

CNO Says What Brazil Can Do

Rio de Janeiro JORNAL DO BRASIL in Portuguese 10 Jul 82 p 15

[Article by Romualdo Barros: "Admiral Says What Brazil Can Do"]

[Text] Brazil is in a position to make the atomic bomb but that is not the country's desire. In the third millenium, issues will not be decided by atomic bombs. Gases, for example, have already caused such destruction on both sides that they were never used again. This is what we call the balance of terror. We must develop defensive weapons. And defensive weapons for the third millenium must be laser ray, microparticles and others. But not the atomic bomb."

This statement was made by the CNO, Sqdn Adm Jose Gerardo Theophilo Albano de Aratanha who concentrated on physics in his university education. He gave a press interview after presiding over the opening of the Admiral Jurandyr da Costa Muller de Campos ammunition factory of the Navy. Operated by a private outfit called FI Industria e Comercio Ltda, the factory is already producing under contract for ENGESA [Specialized Engineers, Inc] and it is to get $7 million (1.2 billion cruzeiros) for its participation in the export of tanks.

Private Control

FI Industria e Comercio Ltda is managed by engineer Alvaro Buarque Goulart who took courses at the Military Engineering Institute and in the Navy; he was promoted to the rank of Lieutenant Commander and was transfered to the reserve in 1973. He believes that the business experience he is getting in the ministry's agency can be useful if a decision were to be made to turn the Rio de Janeiro Naval Arsenal over to private control.

"As I see it, the Arsenal must be placed under private control. Of course, this must be part of a long-term program because of the complexity of the undertaking," said engineer Goulart. As for FI, he added that it is using land and equipment belonging to the Navy and this is why the investment--500 million cruzeiros--is relatively small. Initially it employed 270 workers, both men and women, mostly from among Navy personnel; by the end of the year, it should have 600 workers.

Located on Brasil Avenue, at kilometer marker 45, in Camp Grande, FI Industria e Comercio Ltda is using steel, aluminum, copper, and tin as raw materials to make the casings (the metal part) for cannon shells. By the end of the year, an annex is to be built there to fill those casings (the powder will come from the Army's factory in Piquete) and to deliver the ammunition ready for use. In addition to this, it will use machinery already installed to make parts for guns.

The idea of turning the Navy Arsenal over to private control is now being examined, Admiral Aratanha admitted. He added however that the Arsenal is operating as a shipbuilding facility and as a repair center for Navy warships. This latter function places it among the institutions which serve national security and that rules out the possibility of private control.

As for the cut in the imports of the Navy Ministry by $45 million, ordered by the president of the republic for all government agencies, "This is cause for concern to the extent that it can delay the corvette construction program to replace the destroyers which have been in operation for 36 years," he said.

Admiral Aratanha presided over the ceremony, representing Navy Minister Maximiano da Silva Fonseco. VAdm Mario Jorge da Fonseca Hermes, who is in charge of the Armament and Communications Directorate of the Navy, read his order of the day, emphasizing that the honoree, Admiral Jurandyr da Costa Muller de Campos, preached extensive cooperation between the civilian and military industrial sectors for the national development of technology.

The widow of Admiral Muller de Campos, Mrs Celia Lima Muller de Campos, unveiled the commemorative plaque at the ammunition factory.

During the various interviews which he granted newsmen present at the opening, Admiral Aratanha emphasized the need for "Brazilians being prepared to defend the nation." He recalled however that "Humanity must learn to live in peace."

Navy Minister's Comments

"It is an exaggeration," said Navy Minister Adm Maximiano da Fonseco yesterday after denying that there is any initiative in his ministry aimed at making Brazilian atomic bombs. He added that the Navy is pursuing research in the area of nuclear energy "but for the purpose of using it in ship propulsion which has priority."

Adm Maximiano da Fonseco at the Navy Arsenal presided over the ceremony for the keel-laying of the hospital ships "Oswaldo Cruz" and "Carlos Chagas" which will be delivered within 24 months. The two vessels will have four wards, an operating room, dental offices, outpatient facilities, laboratories, and x-ray equipment and will be used to assist the people living along the rivers in Amazonia.

In the quick interview which he gave after the ceremony, the navy minister admitted that the reequipment plan for the Navy "is coming along slowly and not with all the funds which we need." But he did emphasize that the main objective is being attained "since the main concern of the reequipment plan is to make sure that Brazil will not have to depend on anybody ever."

Adm Maximiano da Fonseco mentioned as example the ammunition factory opened yesterday morning in Campo Grande. "With this factory, we will no longer have to stockpile ammunition. In case of an emergency, our need can be taken care of in 24 hours," he explained.

Military Research Denied

Rio de Janeiro JORNAL DO BRASIL in Portuguese 11 Jul 82 p 34

Sao Paulo--Aeronautics Minister Delio Jardim de Matos yesterday said in Pirassunuga (in the interior of Sao Paulo) that the administration is not studying nuclear projects for military purposes. He did not wish to talk any further about the matter and asked that the director of the Aerospace Technical Center at Sao Jose dos Campos, MGen Lauro Nei Menezes, who was by his side, provide further explanation. The latter officer noted that research in this field was not aimed at "immediate application" and that "there is nothing secret about it."

"The entire Brazilian scientific community is involved in our project so that there has been a little bit of sensationalism, such as in the SBPC itself, whose 34th meeting was held in Campinas," he told newsmen. "The scientists talked about these things, they said everything and therefore they knew everything. There was nothing secret about this," said the CTA director.

5058
CSO: 5100/2219

ARLIT, AKOUTA URANIUM DEPOSITS, PRODUCTION DESCRIBED

Niamey SAHEL HEBDO in French Special Issue 15 Apr 82 pp 37-39

[Article by Massalaki Abdoulaye Moussa: "The Air Mines: Arlit-Akouta or the Uranium Adventure"]

[Text] Arlit and Akouta, located on the southern edge of the Hoggar, some 250 km northwest of Agadez--whoever hasn't discovered these cities, synonymous with uranium, doesn't really know Niger or suspect its variety, the harshness of the climate and the courage of its people. It should be done, however, because it's in the midst of sparse bushes and a few tufts of grass, testimony of a dry desert climate, that the thousands of Nigerien executives, workers and employees of the uranium mines that provide nearly 80 percent of Niger's export revenue live and work. For the lazy, it's a matter of seeing Arlit and Akouta and "dying of shame."

The Birth of the Corporations

The recent history of this region began in 1956 with the explorations made in Niger by the Atomic Energy Commission (CEA). It was these geological explorations that led to the discovery, between 1960 and 1966, of several exploitable uranium deposits.

Since then, the pace has quickened. On 1 February 1968, the Air Region Mining Company (SOMAIR) was created, a Nigerien corporation whose capital, originally 2.7 billion [CFA francs], would later reach 4 billion.

SOMAIR is working a portion of the Arlit uranium deposit leased by the CEA, a deposit whose concession will from now on be held by the General Nuclear Materials Company. The creation of the Akouta Mining Company (COMINAK) occurred on 12 June 1974, with the purpose of working the Akouta uranium deposit leased to it by COGEMA. This deposit is located 10 km southwest of the city of Arlit.

SOMAIR's Operations and Production

The Arlit uranium deposit is located in sedimentary formations constituting a gigantic foliation in which sandstone and clay overlay one another in layers of varying thicknesses. The area leased to SOMAIR is divided into three zones: Arlette, Ariege and Artois.

The Arlit deposit is an open-pit operation, which necessitates strip mining. In certain worked portsion, the barren material covering the ore-bearing formations is 35 to 80 meters thick. For just the Arlette zone, a little more than 3 million tons of scrap had to be stripped off before the ore-bearing zone was reached at the end of 1970.

The ore extracted from the quarry is first crushed and dry-heat pulverized. In this powdered form, it undergoes sulfuric acid treatment for 2 1/2 to 3 hours. After layer separation and drying, liquid uranyl sulfate is obtained. Purified by an organic solvent, the uranium, in the form of uranyl carbonate, is extracted by using sodium carbonate.

By adding caustic soda, the decomplexing of this latter product is carried out, along with the precipitation of uranium in the form of sodium uranate. After being dried and weighed, the sodium uranate is sampled and then stored. Sale of the product to the shareholders--ONAREM [National Office of Mineral Resources] (33 percent), COGEMA (26.96 percent), French Company of Mokta, Minatonne, etc.--can then begin.

In 1971, specifically on 1 January, the first output of marketable product, at about 70 percent quality, was obtained. That year, 410 tons were produced. Production steadily increased: 1,305 tons in 1975, 1,460 tons in 1976, 1,710 tons in 1978, 1,780 tons in 1979, 1,930 tons in 1980 and 2,105 tons in 1981.

Akouta: A Deposit 250 Meters Down

Ten km southwest of Arlit, in a monotonous countryside of sandstone outcroppings and sandy stretches, stands Akouta. The site of this second uranium deposit worked on COMINAK is topographically indistinguishable from the surrounding barren area. The Akouta workings are not open-pit.

In fact, the deposit is 250 meters deep (260 meters in certain portions of the mines), in moderately carboniferous sedimentary formations. The urganium is located in sandstone formations 1 to 15 meters thick, with concentrations between 2 and 6 kgs of uranium per ton of ore. In addition, the ore contains molybdenum.

To reach the deposit, one must follow a descent formed by two parallel shafts at a 20-degree slope, dug by Nigerien workmen along 1300 meters between September 1975 and September 1977. To achieve this, they drilled, dynamited, loaded waste, cleared it and braced the gallery roof to support the unpressured sandstone outcroppings.

In this mine, undoubtedly the first entirely underground one in the world, it's not only blast-loosened blocks that fall: it rains constantly along certain sections of the galleries, which now total 45 km. The Akouta mine is thus the only place in Niger where it rains every minute of every day: the rate is 250 cubic/hour. The pumped water is used as industrial water in the installations, particularly in the ore-processing facility.

Ventilation is also a significant problem, because it must be adapted to the climatic conditions created at the bottom of the mine by hot water and also by emission of radon, a radioactive gas found in every uranium deposit. Ventilation is made possible by 40 vertical shafts totalling 2,140 meters in diameter, linking the bottom to the surface. Air circulates with a strong flow (675 cubic/second) in the galleries, which are 6 meters wide, 6 meters high and 24 meters apart.

Radioactivity of the work site is also carefully monitored: external radiation is measured for each employee working in a controlled zone; radon concentration is also measured at each site, as is the concentration of radioactive particles. All this is done to prevent workers from exceeding the standards of irradiation protection.

The processing facility has a nominal capacity, expressed in metal content, of nearly 2,000 tons of uranium per year (it also processes molybdenum--100 tons per year).

A conveyor belt feeds the crusher in which the different fragments of ore are reduced. Mixed with sulfuric acid, then oxidized, the product remains in maturation vats. After settling, the uranium-bearing liquid is treated with solvents. As a final touch, the uranium is precipitated out by magnesium to form magnesium uranate. After drying, the product is put into 220-liter metal vats.

Production of the first concentrate of magnesium uranate was achieved on 31 August 1978. The uranium produced in this form has been steadily increasing, from 351 tons in 1978 to 1,839 tons in 1979, 2,200 tons in 1980 and 2,260 tons in 1981. In 1982, if the 2,300 tons predicted are obtained, the production will bring COMINAK's sales figures to 55.2 billion, more than the treasury outlays made between 1974 and 31 August 1978 for the complete construction of the installations, expenses totalling 54 billion CFA francs (in today's francs).

9939
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NEW MEDICAL DIRECTION IN UTILIZATION OF CYCLOTRON FOUND

Pretoria SCIENTIAE in Afrikaans Apr-Jun 82 pp 24-26

[Text] Personnel of the National Accelerator Center (NAC) will be making an important contribution in radiation therapy in South Africa when the Transvaal Department of Hospital Services will begin treating certain cancer growth with accelerated neutrons at the Pretoria cyclotron in the campus of the Council for Scientific and Industrial Research (CSIR) starting next year.

The necessary modifications are now being made in the cyclotron with a view of the ultimate production of a high intensity fast neutron-deuteron for this special cancer therapy. Neutrons will be accelerated within the cyclotron and thereafter inside upon a thick beryllium disk and in so doing produce fast neutrons by way of a known nuclear reaction.

The Transvaal Provincial Administration (TPA) has made available an amount of 500,000 rand for the development of the accelerated neutron facility where patients will be receiving cancer therapy. The medical components, personnel and facilities will all be provided by the TPA.

Therapy

The fast neutrons will be applied mostly for the treatment of advanced cancer growths in the head and neck. These cases are often too advanced for surgical treatment and usually have a poor oxygen supply at the malignant growth which in many instances renders unsuccessful the gamma rays applied in conventional therapy. Radiobiological studies have shown that the effect of fast neutrons is less dependent on the presence of oxygen and this explains the radiotherapeutic interest in fast neutron therapy in the past decade.

Patient statistics in South Africa have shown that these types of growths occur mostly among the black population. It is expected that the first patients could be treated even before mid-1983. This treatment will be administered by radiotherapists, radiographists and medical physicians of the Johannesburg and H. F. Verwoerd hospitals.

The program will unfold in two ways. First of all the Pretoria cyclotron must be modified so as to be able to provide an external neutron-deuteron of

50 micro Amperes in the experimental room adjoining the cyclotron room. Secondly it will be necessary to conduct radio-biological experiments which provide satisfactory results before patients can be treated.

Hand in hand with this there is of course the determination of the physical characteristics of the neutron beam as well as the protection of the personnel. The knowledge and experience gained with these projects will serve as a forerunner for the planning and development of similar projects at Faure, near Capetown, when the open sector cyclotron of the NAC, which is under construction there, is put into operation.

Modifications

The modification of the cyclotron in Pretoria will be carried out in two phases. The first thing will be the designing of a passive magnetic channel which will be placed in the cyclotron between the two D-parts on the south side so as to focus the external beam in the horizontal direction partially. Hopefully this modification will increase the neutron beam on the beryllium disc by a factor from 3 to 4 and in so doing provide a more appropriate dosage rate for radiobiologic experiments.

In order to realize an external neutron=deuteron of 50 micro Amperes in the experimental room a second active magnetic channel will be designed and positioned in the withdrawal chamber. The withdrawal room is coupled directly to the cyclotron and is now used only for isotope production. Since the radioisotope production continues to constitute an extremely important and necessary part of the present program these modifications must be made with a minimum interruption of machine time.

Because the neutron=deuteron of 50 micro Amperes or more will be causing an enormous neutron flood upon a beryllium disk it will be necessary to build a neutron collimator for therapy as well as a shielded chamber in the experimental room. The design of the collimator is such that it will allow the passage of a portion of the high energy neutron flood, which arises in the beryllium disc at the terminal of the beam-line, through an opening having variable dimensions while the remaining fast-moving neutrons will be losing almost all of their energy within the neutron braking and absorbing material around the opening, or will be entirely arrested. This part of the project will be carried out in collaboration with the radio therapy personnel of the H. F. Verwoerd Hospital and the Johannesburg General Hospital.

Pilot Project

The first radiobiological experiment with fast neutrons upon cell cultures were already conducted last year at the Pretoria cyclotron. These experiments constitute a part of a pilot project for comparing the effect of gamma rays (origination from Cobalt^{60} source), electrons and fast neutrons on the survival of known cell cultures. Specific cells were selected for this purpose, because extensive radiobiological studies have already been carried out with these types of cells at several prominent foreign institutions.

Since the same nuclear reaction is being employed here as in the Hammersmith Hospital in England and the two cyclotrons are of the same energy, the shape of the survival curve obtained here will be comparable with that of [illegible] Hammersmith.

By comparing the survival curves as determined with the two machines, it will be possible to determine the relative biological effectiveness (RBE) of the various modalities with respect to each other. This radiobiological experiment inaugurates a new direction for the utilization of the cyclotron which up until now has been used mostly for basic nuclear physics research and the production of isotopes.

Some of the projects forming a part of the development of the fast protons facilities will be undertaken by the Pretoria cyclotron group in collaboration with the universities of Pretoria, Potchefstroom and Witwatersrand.

7964
CSO: 5100/5678

SWEDISH FIRMS OFFICIALLY HAND FINLAND SECOND OLKILUOTO UNIT

Helsinki HUFVUDSTADSBLADET in Swedish 4 Jul 82 p 6

[Text] On Thursday, the Industrial Power Corporation [IK] and Sweden's ASEA-Atom signed the final agreement handing over the second nuclear power plant unit in Olkiluoto.

It was chiefly repeated rotor trouble in TVO-2's generator that delayed acceptance of the plant. According to Magnus von Bonsdorff, the IK's managing director, the company could not accept a plant that was not perfect in all respects.

Under the terms of the original agreement, the plant was to have been completed in 1980.

Construction work on the TVO-2 unit began in 1975, and the plant was ready for fuel loading 4 years later. In 1980, the TVO-2 power plant was hooked up to the national grid for the first time. After that, however, there were repeated breakdowns whenever the ASEA-manufactured generator and its rotor were started up.

Last year the rotors at both TVO-1 and TVO-2 were replaced. This year, operation has continued without any breakdowns to speak of.

Managing director von Bonsdorff emphasizes: "Starting up the TVO-2 unit is part of the largest integrated industrial project in Finland. Building the two nuclear power plant units in Olkiluoto has required top-level international skill and effort."

Lars Halle, managing director of ASEA-Atom, emphasizes that cooperation between the two parties to the agreement has been consistently good, but there is reason to be skeptical about that.

Last year, for example, the Industrial Power Corporation spent 120 million marks to buy two standby generators from Brown Boveri in the FRG.

And the Industrial Power Corporation's claim for damages due to delays in delivery stirred up a commotion in Sweden. The damages amounted to between 150 and 200 million kronor.

According to managing director von Bonsdorff, however, the signing of the agreement means that the economic disputes that may have existed between the two parties have now been resolved. But neither the Industrial Power Corporation's representative nor ASEA-Atom's will say in detail what kind of solution the parties reached.

Von Bonsdorff says: "We reached a compromise solution that satisfies both parties and makes final acceptance of the TVO-2 unit possible." The only questions remaining are those concerned with the plant's operation.

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13 August 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 157

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WORLDWIDE REPORT

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SOVIETS AGREE TO LIMIT FINNISH NUCLEAR PLANT TO 1,000 MW

Helsinki HELSINGIN SANOMAT in Finnish 16 Jun 82 p 27

[Article: "Only Large Power Plant Discussed Between Finland and Soviet Union"]

[Text] Economic Adviser M. V. Titov of the Soviet Embassy in Helsinki emphasizes that the feasibility study agreement between Imatra Power and Atomenergoeksport concerns only a 1,000-megawatt nuclear power plant.

According to Titov the possibility that the feasibility of two 500-megawatt power plants would be studied is a matter which has been discussed primarily only in the Finnish press.

Counselor of Mining Pentti Alajoki proposed publicly some time ago the possibility that instead of a 1,000-megawatt nuclear power plant the construction of two 500-megawatt units could be considered with respect to the next power plant project.

From a technical point of view the construction of a 500-megawatt power plant would not, however, present any particular problems according to Soviet experts. The reactors in the present 460-megawatt plants at Loviisa are capable of developing a 500-megawatt capacity, but the turbines have been designed for a smaller output.

The nuclear power plant was uppermost as an unofficial issue at a press conference in Helsinki on Tuesday in the office of the economic affairs section of the Soviet Embassy in connection with the 25th anniversary of the establishment of the Soviet State Committee for Foreign Economic Relations.

The state committee and its subordinate organizations have relations with more than 80 countries. There are 4,000 projects under its jurisdiction, of which more than 2,600 are in operation.

Cooperation on Development

There is room for development in cooperation between Finland and the Soviet Union since according to Titov the Finns are not taking full advantage of all those opportunities which cooperation can offer them in the chemical industry, the machine building industry, and the foodstuffs industry.

He emphasized that Soviet enterprises also have considerable experience in projects connected with transportation and environmental protection.

The Soviets are also ready to participate in projects of a smaller scale such as the nuclear power plant at Loviisa, Rautaruukki, the power plant at Tahkoluoto, and the gas pipeline.

As an example of smaller joint projects Titov mentioned the purfication plant in Kemi. "This type of cooperation will create a good foundation for continuing a similar type of cooperation in third-party countries also. Cooperation between V/O Tyazhpromeksport [All-Union Association for Heavy Industry Exports], Rautaruukki, and Perusyhtyma is a good example of this."

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KWU COMMENTS ON SALE OF U.S. COMPUTER TO ARGENTINA

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 22 Jul 82 p 31

[Text] The spokesman for KWU--Kraftwerk Union--Wolfgang Breyer, said yesterday that the sale of a computer system by the United States for the heavy water powerplant being built by the Swiss company, Sulzer Brothers Limited, in Argentina does not mean the abandonment of the policy of restrictions on countries which did not sign the nonproliferation treaty. As in Brazil, the KWU is also the main foreign company involved in the nuclear program in Argentina.

According to Breyer, the computer system exists on the international market and could have been obtained from other countries without any mystery whatever. He explained that the heavy water powerplant is only a chemical plant, not a nuclear plant, because it causes no radiation nor does it handle radioactive elements, although it is fundamentally for the type of nuclear program chosen by Argentina, which uses heavy water and natural uranium reactors.

Breyer explained that heavy water is necessary for use as a reactor moderator (moderating the process of chain fission) and that all the countries which produce atomic bombs do so with military reactors which produce plutonium and are moderated by heavy water, except England and France, which obtain plutonium for military purposes in gas reactors moderated by graphite. Heavy water is one of the methods, but not the only one, for obtaining the atomic bomb, according to Breyer.

Inspection

The KWU engineer declared that there is confusion in the news and that the fact that it sold the computer system does not mean the United States is going to change its policy of forbidding the transfer of sensitive technology to countries, which like Brazil and Argentina, are developing their own nuclear programs. In Breyer's opinion, the Argentine Government is the one who controls its nuclear program, not the United States, and since the heavy water powerplant is under safeguards, like the entire Argentine nuclear program, the International Agency of Vienna [IAEA] can make an inspection if it so desires.

Therefore, the German engineer sees no reason why the North Americans should not sell its computers, which can be bought in France, Japan, Sweden, Germany and other countries, without any great problem. Breyer also declared that there was no cancellation of the Argentine nuclear program because of the support Germany gave to England in the Falkland conflict. He explained that the president of the National Atomic Energy Commission [CNEA] of Argentina, Vice Adm Castro Madero, was recently in Germany and guaranteed that the agreement between the two countries would be fulfilled regardless of the Falklands episode, but with a delay of 1 year due to the lack of resources Argentina is undergoing.

Because of that delay, he said the Atucha II nuclear powerplant, which is under construction, will not be inaugurated in 1987 but in 1988. Because of that, Argentina will have another year to decide on the construction of the other three powerplants of a total of four scheduled by the year 2000. Breyer also said that the fuel element plant of Ezeiza is ready and in operating condition.

Brazil-Argentina

On 17 May 1980, a protocol of understanding was signed between Minister Carlos Washington Pastor and Ramiro Sariava Guerreiro, pursuant to which Brazil and Argentina would begin to engage in technical and commercial collaboration and in the technological development of the nuclear sector. That was practically the beginning of a pact between the two countries for resisting North American pressures against the installation of a nuclear industry sought by Argentina and Brazil.

In the commercial field, this pact has already borne fruit, with NUCLEP--NUCLEBRAS [Brazilian Nuclear Corporation] Heavy Equipment--responsible for the lower part of the pressure vessel for the Atucha II reactor, while the CNEA will supply the zircalloy covered pipes to be used as rods in the Brazilian reactors. Argentina will also provide Brazil with 240 tons of uranium concentrate when the fuel element plant at Resende is in operation.

8908
CSO: 5100/2224

MILITARY SOURCES SAY DEVELOPMENT OF NUCLEAR WEAPONS INEVITABLE

Brasilia CORREIO BRAZILIENSE in Portuguese 14 Jul 82 p 3

[Text] "Brazil is working on the development of its research, always with a view toward technological independence, which in the future may lead to the initial project of the atomic bomb, but as a natural consequence. That does not mean, however, that we are working to arrive at that project." It is a matter of scientific and peaceful research. This is the opinion of several military persons questioned yesterday in Brasilia, who firmly advocated the need for having our own means for research in addition to affirming that Brazil should have the right to learn atomic technology.

Those same sources explained, however, that if Brazil were interested in acquiring the technology or redoubling its efforts for manufacturing the atomic bomb, it would have initiated its research many years ago in the example of Argentina. However, they emphasize, "It is obvious that we cannot remain behind with respect to the other countries of the world. We also need research in the nuclear area because it is very important for the future of countries. The navy itself needs to use nuclear energy for the propulsion of submarines."

Researching uranium in its natural form, say the military persons, "We shall inevitably arrive at nuclear weapons. It is only a question of time. Argentina has developed its nuclear policy through its local technology. That should be the path taken by all countries."

"Even with the Malvinas War, which must have delayed and even upset the nuclear program of that country, we today are not in a condition to compete with Argentina in that area, since they have been working on that project since the decade of the 50's, regardless of the politics of that country." We, added the military persons, are only beginning atomic research, but even with purely peaceful intentions, studying the various reactions of uranium, we shall get there.

8908
CSO: 5100/2224

CTA OFFICIAL: NUCLEAR RESEARCH HAS NO MILITARY OBJECTIVE

Rio de Janeiro JORNAL DO BRASIL in Portuguese 9 Jul 82 p 20

[Text] Sao Paulo--"We are in no position to reach the point you imagine we are going to reach." That is the opinion of Air Force Gen Lauro Ney Menezes, general director of the Aerospace Technology Center [CTA], concerning the possibility that Brazil will develop a military nuclear device on the basis of programs developed by scientists at the Institute for Advanced Studies [IEA], one of the seven research organizations operated by that unit of the Ministry of Air in Sao Jose dos Campos.

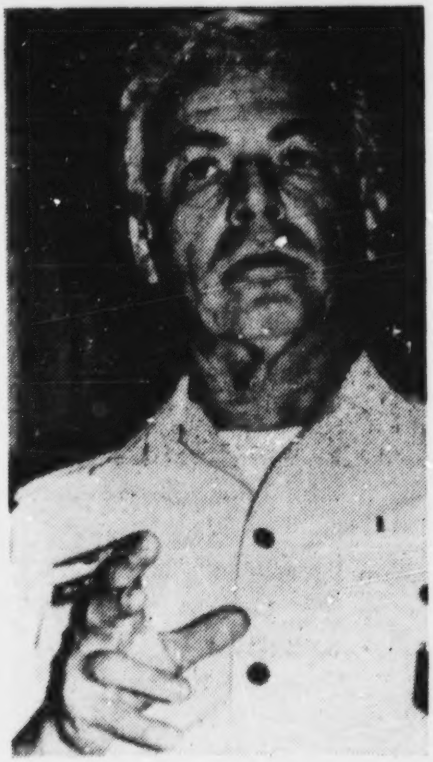
The general explained that the construction of fast nuclear reactors--one of the IEA's priorities--will insure the country of maximum efficiency in utilizing the existing reserves of thorium and uranium, but that "only a critical analysis of the technical aspects, weighed against the political, economic, and strategic implications, will dictate the type of reactor most suited to Brazilian reality."

Strategy

The IEA was established because of the need to conduct research on the frontier of human knowledge, "because no one transfers or sells strategic technology," General Menezes emphasized. He recalls that the institute's purpose is to supplement the necessary support for projects developed by the CTA's other institutes "by conducting research in pure and applied science to meet the needs of important programs of national interest."

According to him, the IEA's four priority research programs are concerned specifically with development of the laser, construction of an electron linear accelerator, construction of a fast nuclear reactor, and laser enrichment. The CTA's director stressed that none of those programs has a military objective: their only purpose is to provide technological capability.

He commented: "That would not prevent the research from leading to military byproducts, such as the rangefinder designed on the basis of laser studies," and he pointed out that in such a case, it would be a matter of "serendipity"--an English word meaning "the gift of making felicitous and unexpected discoveries."



Air Force General Lauro
heads the CTA

Colonel Amorim does
research at the IPEN

Ney Menezes emphasized that "to the extent that we advance toward the frontier of human knowledge and increase our technological capability, we will be freeing ourselves of the conditions set by the external market and bringing decisionmaking power to the national territory, thereby taking charge of a share of our progress and extending our sovereignty."

No Secrets

According to General Menezes, none of the IEA's programs is secret, and they will all take a long time to mature, "since the actual intention is to establish a group with high technological capability made up of civilian and military scientists."

He revealed that the IEA maintains a program of exchange with the Brazilian Center for Physics Research, the Physics Institute of Sao Paulo University, and the Physics Institute of Campinas State University, as well as being in close contact with institutes abroad such as the Max Planck Institute in the FRG. Currently, the institute is finalizing arrangements for new scientific cooperation with Sao Paulo University and the California Institute of Technology in the area of atomic and molecular physics as part of the bilateral cooperation existing between Brazil's National Council for Scientific and Technological Development and the National Science Foundation of the United States.

Energy

As for the program aimed at producing a fast nuclear reactor, General Menezes explained that that project involves an assessment of the cycle and the choice of the technology for fast breeder reactors that is most suited to Brazilian reality.

He emphasized that the construction and testing of a low-powered experimental unit is aimed at providing the country with "maximum efficiency in utilizing the existing reserves of thorium and uranium." According to official estimates, those reserves amount to about 215,000 tons of uranium and 1.27 million tons of thorium oxide. Those reserves would enable Brazil to produce electricity for 1,300 years with uranium and for 7,800 years with thorium, including in that calculation all the electric power produced by the country's total hydroelectric potential.

Another IEA priority in the nuclear area is to develop a 180-million-volt electron linear accelerator. That accelerator will be used for research and the acquisition of technological know-how in the nuclear area. The project is staggered in such a way that it will begin with construction of a 17-million-volt accelerator in cooperation with the USP [Sao Paulo University] Physics Institute. This will be followed by construction of a basic unit for the accelerator that will eventually produce 180 million volts.

IPEN Investigating Reactor Material

Sao Paulo--The Nuclear and Energy Research Institute [IPEN] of Sao Paulo, an organization connected with the National Energy Commission and NUCLEBRAS [Brazilian Nuclear Corporations], has been engaged over the past 5 years in a series of research projects commissioned by the Aerospace Technology Center and concerned with various materials and fuels that will be used in Brazilian atomic reactors.

The contract, which has not been publicized during those years, is concerned with research intended chiefly for use by the CTA's Materials Department. At the IPEN, the work is done at the chemical engineering and nuclear metallurgy centers and is concerned with the applications of uranium, thorium and zirconium. The results are sent directly from Sao Paulo to Sao Jose dos Campos by computer hookup. There the information is received and stored by computer.

Research

In that nuclear research, the CTA processes information received from the IPEN and also from UNICAMP [Campinas State University]. The work is condensed and coordinated by the Institute for Advanced Studies, which was established precisely for that purpose on land belonging to the CTA. It was there that the air force initially developed a zirconium alloy (a material with which uranium is significantly associated) for use in manufacturing airplanes.

In the second phase, however, direct research with nuclear fuels began. The superintendent of the IPEN, Hernani Augusto Amorim, explained that the study center supplies the CTA with research concerning the nature of impurities in nuclear materials. For that purpose, it uses high-resolution gamma-ray spectrometry, X-rays, mass spectrometry, and electrochemical methods. In addition, it employs electronic microprobes and conducts general tests, including tests for surface corrosion on a microscopic scale.

Amorim explains: "It all began when the CTA looked us up because we had the technicians and equipment it needed for its research with zirconium. For example, we have a microscope that is the only one of its kind in the country. Then there began to be more than enough zirconium uranium, and the research became diversified. Today the CTA is also trying to obtain uranium from another ore: caldasite, which is abundant in Pocos de Caldas."

Zirconium is also used to manufacture the rods containing the fuel that is placed in the reactors. Another atomic element also being researched by the CTA--thorium--cannot be used to fuel the thermal reactors that Brazil will build, but it can be used in the fast reactors, whose technology is also reportedly being studied in Sao Jose dos Campos for military purposes. Amorim admitted: "That item must be included in the so-called classified (secret) work that the IPEN also does for the CTA."

Concerning the IPEN's participation in furnishing support material for the CTA's research with fast reactors, Amorim said he did not know what the work his institute provides is used for. He explained: "We operate as a laboratory that simply fills prescriptions."

Underground Laboratories

Sao Paulo--The IEA is located under the lawn at the CTA in Sao Jose dos Campos along the road linking the Dutra Highway to the state's northern coast. In addition to those hexagon-shaped underground facilities, six buildings are being prepared for occupation by 1,200 employees, including 500 scientists who will work on the fast reactor and laser enrichment unit projects in addition to doing other research.

About 200 employees already work in the underground laboratories. Their number includes specialists who have taken postgraduate courses in the FRG, France, Great Britain, and the United States. Only personnel authorized by the CTA are allowed to enter the facility. The IEA complex will not be completed until 1985.

Installed in the underground facility a few years ago and still in full operation is a computer of the latest generation with large storage capacity. It is the Data Cyber 170/750, manufactured by the Control Data Corporation of the

United States. It is programmed to accept about 15 million instructions per second and to process the technical and scientific data needed for the research done at the center. It also provides nuclear and aerospace technological solutions. Its terminals are linked to UNICAMP, the IPEN, and the National Nuclear Energy Commission in Rio de Janeiro.

IEA Working With Lasers

Sao Paulo--The origin of the Aerospace Technology Center's Institute for Advanced Studies (IEA) was a contract signed in 1973 with the Campinas State University (UNICAMP) to conduct research into the separation of uranium isotopes using laser beams.

UNICAMP's laser group was able to develop isotope separation and the production of heavy water in theory, but once research passed to a less theoretical and more practical stage, it became the province of the CTA (which established the Laboratory for Advanced Studies, later transformed into the IEA) and the Nuclear and Energy Research Institute (IPEN) in Sao Paulo.

Old Idea

Rogerio Cerqueira Leite, director of UNICAMP's Gleb Wataghin Physics Institute, recalled yesterday that Sergio Porto, the Rio de Janeiro physicist, first mentioned the idea of separating isotopes with laser beams to him in 1965, when both of them were working in the United States.

In 1972, on being invited to return to Brazil by Zeferino Vaz, the founder of UNICAMP, Sergio Porto remembered his old idea. With support from Vaz and Cerqueira Leite, Porto signed an agreement with the CTA in 1973 to conduct basic research on isotope separation using lasers. The research was actually financed by the National Nuclear Energy Commission (CNEN), with the CTA and the IPEN acting merely as intermediaries.

Cerqueira Leite said: "Sergio's idea was simple. He only wanted to excite the molecules with atoms of uranium-235 for enrichment. He did not do it, however, with heavy materials, but with light materials such as hydrogen and boron. When the research reached the practical stage, it was transferred permanently to the IPEN and the CTA."

Enrichment

Uranium-235 is fissionable and can be used as is to fuel an electric power plant or a bomb (although physicist Cerqueira Leite regards an atom bomb using enriched uranium as outdated and expensive--a bomb can be produced more easily with plutonium and hydrogen). It happens, however, that it occures in nature at a rate of only 0.7 percent--that is, there is 1 atom of fissionable uranium-235 for every 140 atoms of uranium-238 (natural uranium, which is not as easily fissionable).

Since the masses of uranium-235 and uranium-238 are practically I7-8', it is nearly impossible to separate--or, more accurately, enrich--the uranium and make it fissionable (that is, a fuel) by physical means. Sergio Porto's idea was to bombard the uranium with a laser, thus transferring the beam's energy to the molecule. Since uranium-235 is fissionable, it becomes more excited and can thus be separated--or, more accurately, enriched.

The principle is the same for producing heavy water (the moderator in a natural-uranium reactor). Heavy water is ordinary water with a heavier hydrogen atom (one more proton). That abnormality can also be produced by "excitation" induced by a laser beam.

In 1978, when Prof Sergio Porto died of a heart attack in the Soviet Union, the group engaged in isotope separation by laser was already deactivating its theoretical research and transferring it to the CTA and the IPEN.

11798
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SBPC SEEKS INFORMATION ON MILITARY RESEARCH; REACTION

SBPC Seeks Information

Rio de Janeiro JORNAL DO BRASIL in Portuguese 9 Jul 82 p 6

[Article by Jose Neumanne Pinto]

[Excerpt] Sao Paulo--Brazilian scientists are not criticizing the military institutions for developing applied research programs. They are simply afraid that funds for their own research will be cut as a result of those programs, and they are asking that society be informed not about the content of such research, which is obviously secret, but about its existence.

"We do not want to know what is happening behind the walls of the Institute for Advanced Studies (IEA) at the Aerospace Technology Center (CTA) in Sao Jose dos Campos. We simply feel that society should be informed that such a laboratory exists and that it is engaged in secret research," explained physicist Rogerio Cerqueira Leite, who is going to coordinate the SBPC [Brazilian Society for the Advancement of Sciences]-Brazilian Physics Society symposium on the "Allocation of Funds to Research for Military Applications" that will be held at 1500 hours on Monday as part of the 34th SBPC Annual Meeting in Campinas.

Concern

Physicist Jose Antonio de Freitas Pacheco of the National Observatory had drawn attention to the existence of the CTA's IEA during the 33rd SBPC Annual Meeting, which was held last year in Salvador. Because of his having sounded the alert, the Brazilian Physics Society considered it advisable to take advantage of the 34th SBPC Annual Meeting in Campinas to present specific data on the diversion to military research of funds normally allocated to scientific research.

Freitas Pacheco will speak on Monday morning concerning "The Development of Space Science in Brazil," and Prof Sergio Machado Rezende of the Pernambuco Federal University will speak on "Research in the Area of Electronics and Data Processing."

Rogerio Cerqueira Leite, director of the Gleb Wattaghin Physics Institute at Campinas State University (UNICAMP) will speak on "The World Situation in Arms-Related Research."

Cerqueira Leite said: "I personally don't have the data, but we all suspect that money for basic research is being diverted to military research. Up to this point, the scientific community's attitude has not been one of antagonism, but of alertness. We want to avoid a repetition here of the errors committed earlier in the United States."

According to him, it is not evident when FINEP [Funding Authority for Studies and Projects] is giving money to the military area or to research commissioned from nonmilitary institutions for military purposes.

IEA Denies Nuclear Bomb Intentions

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 9 Jul 82 p 14

[Text] In its nuclear programs, the objective of the Institute for Advanced Studies at the Aerospace Technology Center is "simply to create national capability in that area, with no military objectives in view." This according to a statement yesterday by a highly placed source close to the CTA's management in Sao Jose dos Campos, who was responding to accusations by scientists attending the SBPC meeting in Campinas that a secret program existed for building atom bombs.

The same source said ironically: "That would be great, because it would mean that we have a lot of money. But the truth is something else. The funds are far below the levels that Brazilian society would like to be able to maintain."

According to the official at the center, the IEA's isolation is necessary to its purpose as a research unit for pure science: "a real lineup of brains." However, if one of those specialists "comes up with results in that area (meaning military applications), rest assured that he will keep working." The same official emphasized, however, that "the way the institute's programs are structured today, there is no way to come up with a bomb."

The CTA's approach is to obtain military byproducts from civilian projects, not the other way around, which is the way it happened, for example, in the case of the laser rangefinder for artillery sighting systems. In the field of ordnance, the CTA's priority is the infrared air-to-air Piranha missile, a project that has been frozen for 2 years and will be restarted in 1983 "or even earlier, depending on the availability of funds," and the project for the AM-X aircraft, an attack and interdiction jet aircraft which Brazil is going to build in cooperation with Italy. The timetable for that undertaking has been speeded up by mutual agreement between the air forces of both countries, with the result that the first operational plane will be commissioned by the Brazilian Air Force in 1986.

11798
CSO: 5100/2215

POLITICAL PARTIES POLLED ON NUCLEAR BOMB RESEARCH

Sao Paulo FOLHA DE SAO PAULO in Portuguese 17 Jul 82 p 4

[Text] Giving continuity to the study of subjects of local and national interest proposed by FOLHA, the political parties today express their opinions--through representatives selected by the respective regional leaderships--with respect to the following question: "Should Brazil engage in research for the production of A bombs?"

The writers are: Gastone Righi for the PTB [Brazilian Labor Party], Euzebio Rocha for the PDT [Democratic Workers Party], Luis Carlos Menezes for the PT [Workers Party], Flavio Bierrenbach for the PMDB [Brazilian Democratic Movement Party] and Elias Assis Filho for the PDS [Social Democratic Party].

Tomorrow the political groups will make an analysis of their activities in response to the following questions: "What errors has your party committed?"

PTB "We must remain a peaceful nation." (Gastone Righi)

Since antiquity, war, as one of the beasts of the apocalypse, has been one of the most frightful scourges of humanity.

In modern time, when weapons of individual destruction were replaced by atomic power, which decimates entire populations and places in jeopardy the very survival of the planet, it becomes a permanent threat we all repudiate. However, it is not the possibility of the construction of armaments we must fear but their actual construction and use for warlike and destructive purposes.

The more civilization advances scientifically and technologically, new weapons and forces of destruction and disintegration will inevitably be discovered and developed. New scientific experiments for peaceful purposes, primarily in the energy field, automatically result in military advantages.

The same dynamite, which as a bomb destroyed human lives, serves for blowing up mountains for the construction of dikes and dams. The same equipment which propels a missile, propels a rocket for space research or modern forms of aircraft which carry people and merchandise. The same nuclear energy, which can raze cities, powers electric powerplants, ships and submarines, and its technology produces radioisotopes for medical and industrial purposes.

Through research in nuclear fission in the process of atomic disintegration, new discoveries, as well as the most modern and sophisticated technology, may be acquired, benefitting humanity, particularly Brazil which is rich in radioactive minerals and without the technological resources for using them.

We are, and we must remain, a peaceful nation. However, we cannot remain an underdeveloped country dependent on more advanced countries. We must catch them and pass them if possible. In the present, and much more so in the future, this will be conditioned by the scientific and technological domination acquired. For this, it is necessary to do research, not on the atomic bomb, but on nuclear energy, even if the dominion of this science will make possible the production of that dreadful weapon.

PDT "Let us discard the priorities of that research" (Euzebio Rocha)

To govern means the establishment of priorities, defining of objectives and planning of activities. However, it is up to political power to orient options. The grandiose and disastrous nuclear program clearly reveals a plutocratic government at the service of the oligarchies, ignoring the interests of the national community. Let us discard the priority agreement that Brazil effect research for the production of the atomic bomb. It is not possible to think that nuclear technology means the production of the A bomb or electricity. Eminent scientist Marcelo Damy has already said: "To confound nuclear activity with production of electricity is the same thing as thinking that electricity means the electric chair."

To have a perfunctory idea of the importance of nuclear technology, it is enough to note the broad field it covers: radioisotopic technology, agricultural applications, gammagraphy, sea water desalinization reactors and nuclear explosions for peaceful purposes.

In all the items cited, nuclear technology is characterized by precision in the solution of problems and economy in costs. Thus, a task of civil engineering accomplished with nuclear explosives becomes a thousand times cheaper than if it were done by grading. A nation which gives up nuclear technology, will lose international competitiveness.

The social well-being of the nation, economic development, the security of the country are linked to the excellence of its scientific life and the quality of education. The system which governs the country works contrary to those principles. It spends $75 billion on a nuclear program which takes us nowhere.

We could build 375 hospital clinics like that of Sao Paulo or pay the foreign debt with that money. The "jet centrifuge" project is a laboratory technique that has not been proved industrially, which consumes 20 times more energy than the other processes. Angra I delayed its operations 5 years and is operating at only 5 percent of its capacity and in an irregular manner. It is the enormousness of a disastrous project which only satisfies the megalomania of incompetent technocrats.

PT "It would be ridiculous for Brazil to develop bombs" (Luis Carlos Menezes)

There are so many and justifiable arguments, based on humanistic principles, against the production and use of nuclear explosives that it could be constraining to enter into the political-strategic merits of the problem. However, even on this plane, it is necessary to combat the "realism" of those who propose construction of such bombs.

The number of nuclear warheads, which could be fired at any moment, available to the great powers is so great, that a small fraction of them is sufficient to partially or totally destroy all the population of the world and make any possible survivors genetically impotent. It would be ridiculous for Brazil to develop some bombs to face this power. The victory of the Vietnamese people against American nuclear power demonstrates that popular resistance is the only means possible for facing world hegemony of any type.

If, on the other hand, there is thought of the bombs for possible conflicts with some Third World country, the stupidity would reside in thinking that a conflict of "nuclear" proportions can take place without the polarization of the great powers and their arsenals, in addition to being in a historically wrong position.

Brazil can undoubtedly become a leader in what is usually called the Third World, particularly when it acquires a democratic system of respect for popular will. The Workers Party hopes that this will be a moral, industrial and agricultural leadership without the perfidy of the powers which proclaim peace but prepare for war.

PMDB "Against any deadly device of the type" (Flavio Bierrenbach)

The PMDB, like the immense majority of Brazilians, is against the use of the atomic bomb and any deadly device of the type. It is unnecessary to argue to defend this point of view. Beginning with the need to defend the ecology and ranging through the undeniable right to life, to the discussion of questions of military strategy, nothing justifies Brazil's engaging in the construction of an atomic bomb. It is not even necessary to argue about the cost of a possible program aimed at the construction of the atomic bomb. Nothing councils such a feat.

In its program, the PMDB advocates the need to increase the scientific-technological capacity of the country. Therefore, it supports nuclear research and the use of technical resources which may result from it for the benefit of the people. However, in order for that to happen, it is necessary to submit the decisions on research to the scientific community and to society.

In this respect, debates such as those of the SBPC [Brazilian Society for the Advancement of Science] on the possible construction of the A bomb, as well as the denials by the government, are necessary to prevent small groups, caparisoned in the trappings of the state, from adopting decisions against the wishes of the nation, which lead to the construction of the bomb, against everything and against everyone.

An example of this type of decision was the one on the construction of the atomic powerplants through the Brazil-Germany agreements, decision made without the knowledge of society and whose calamitous economic and technical results are known by all.

The PMDB in government will be a guarantee that nuclear policy decisions will be made with technical competence and with the approval of society.

PDS "The atom must also be used for military purposes" (Elias Assis Filho)

The atomic bomb is a weapon of aggression, not of defense.

It would be a powerful international tranquilizer if in this time of terrible concerns the discovery of Democritus (the atom) would remain indivisible. Atom means "something which has no volume," something which naturally is not true because it has volume and has weight and is every day more divisible, not only through the discovery of protons, electrons, neutrons and mesons--these were discovered by Cesar Lates--but in the future, through the discovery of other elements which make it up.

When Fermi and Oppenheimer achieved the splitting of the atom, already foreseen long before by Rutherford, these two great scientists feared that the destruction of a single atom would result in the imbalance of matter, a chain reaction, which could mean the destruction of the entire world. Truman allowed the explosion of the first two atomic bombs over Japan and there was no chain reaction, as had already been proved in the laboratory.

The world today groans and exhausts itself in fratrecidal wars. Economic interests are primarily responsible for formidable genocides. A disarmed country is easy prey for the unbridled greed of powerful nations, which enslave it, exploit it, making any independence impossible. As far as Brazil is concerned, no! we shall never be the slaves of anyone and we shall always be the masters of our future. Against the declared aggressiveness of powerful nations and groups we should prepare for our defense. As the Romas said: "Si Vis Pacem, para bellum--If you want peace, prepare for war."

The PDS favors studies for the use of the atom for peaceful purposes also, not as an aggressive means--because we are peaceful--but as a means for defending the country against aggressions, whatever they may be and from wherever they may come.

8908
CSO: 5100/2224

BRAZIL

HIGH-TEMPERATURE PLASMA EXPERIMENTS PROGRESSING AT UNICAMP

Sao Paulo FOLHA DE SAO PAULO in Portuguese 10 Jul 82 p 16

[Article by Laerte Ziggiatti: "Thermonuclear Fusion Energy"]

[Text] A project related to the obtention of energy through controlled thermonuclear fusion--which in all probability will become one of the main solutions for the present energy crisis--has been in progress at the Campinas State University (UNICAMP) since 1974.

A great effort is being made in the principal world research centers for making it technically possible to obtain energy on the basis of hydrogen isotopes, which are deuterium and tritium. In other words, the present state of nuclear fusion development is that of demonstrating its scientific viability in the sense that such a process will produce more energy than the energy applied to produce it. In the next state will come the demonstration by engineering of the possibilities of building a nuclear fusion reactor. The third and last phase will be the construction of a technological prototype of the reactor to make the production of energy at a commercial level practical.

According to the coordinator of the project in progress at the UNICAMP Physics Institute, Paulo Hiroshi Sakanaka, the first scientific demonstration stage will surely be completed within 3 to 5 years in research centers of the United States, Japan, Europe and the Soviet Union, the time for the appearance of the commercial prototype being foreseen as 30 to 40 years.

The UNICAMP project--financed with funds of the FINEP [Funding Authority for Studies and Projects], CNPq [National Scientific and Technological Development Council], FAPESP [expansion unknown] and the National Nuclear Energy Commission [CNEN]--is aimed specifically at the study of magnetic confinement of high-temperature plasmas.

As Professor Sakanaka explains, "The study of those plasmas is essential for obtaining light isotope nuclear reaction." The research group he leads is specialized in nontoroidal magnetic confinement such as the system known as the teta-pinch and the magnetic mirror.

There are two devices of the teta-pinch type and two of the second type in operation, performing confinement of high-temperature plasmas in the Physics Institute for obtaining nuclear fusion reaction. Temperatures reached are on the order of 5 million degrees Celsius. According to Sakanaka, the objective during this phase of research is the study of the heating of plasmas by means of magnetic implosion and the creation of stability rings. Also studied, is the halting of the escape of plasma through the ends and the properties of energy and particle transportation. A larger teta-pinch system known as the "Tupa," financed entirely by FINEP, went into operation March this year.

"In that system," says Professor Sakanaka, "we expect to obtain plasma with high temperatures of between 10 to 20 million degrees celcius."

According to him, the CNEN is very interested in the development of that system, having recently initiated a larger financing with the promise of increasing it substantially from here on.

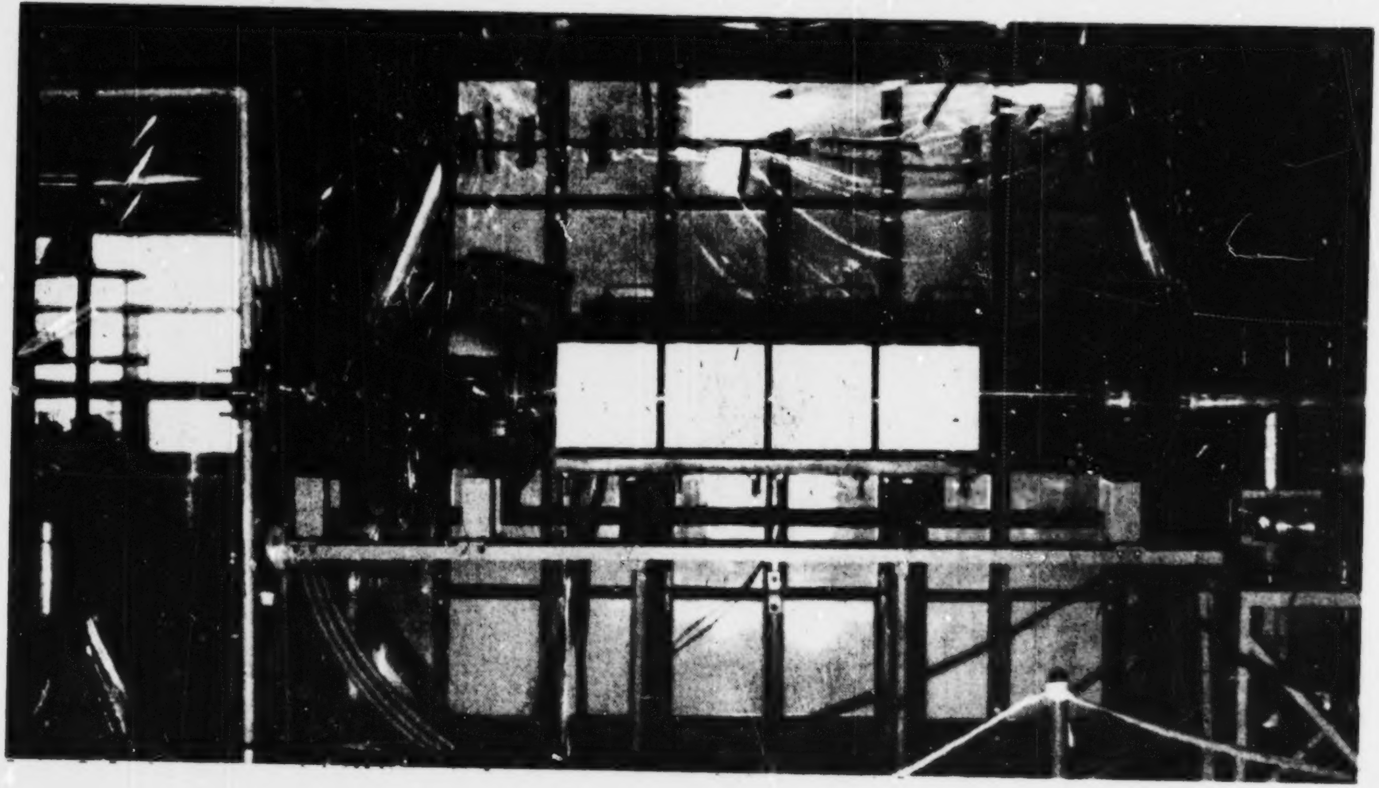
"Brazil is only beginning research in that area and is well behind the levels attained in developed countries," acknowledges Sakanaka. "However," he asserts, the government is very interested in a rapid development in the area," whose still slow pace is basically determined by the shortage of human resources in the country. Here, only six institutions are performing research on plasma for nuclear fusion: the University of Sao Paulo, Federal University of Rio Grande do Sul, the Space Research Institute, the ITA [Technical Aeronautics Institute] and UNICAMP. The main objective of those centers is the training of technical and scientific personnel by means of modest projects, as is the case of the University of Sao Paulo, which is building a small toroidal confinement machine known as the "Tokamak," for learning purposes.

In August 1981, upon the initiative of the Ministry of Mines and Energy and the coordination of the CNEN, a planning commission was created which prepared a national physics program on controlled thermonuclear fusion for the purpose of unifying the up until now scattered research efforts in that area. According to Professor Sakanaka, it makes no sense to dilute resources by having several centers devoted to the same research, it also being an objective of that commission to train a national team on the physics of plasma in thermonuclear fusion. He said that Minister Cesar Cals also intends to send this project of unification to President Joao Batista Figueiredo this year.

"That center, if created, will certainly intensify research on nuclear fusion among us, however, within the possibilities in human and financial resources of the country," says the UNICAMP physicist.

The Process Does not Release Radioactivity

Professor Paulo Hiroshi Sakanaka asserts the project is not even remotely a result of any other nuclear agreement of the type established between Brazil and Germany, which is the object of criticism, not only because of the large amounts of funds allocated to it, but also because of the danger represented by radioactivity. The fact is that in the latter project, energy is obtained by the fusion of heavy atoms such as uranium, producing radioactive isotopes with an average life of 500 years. It is cumulative radioactive pollution, with problems of storage of that "waste", which has not yet been resolved satisfactory. Moreover, says Sakanaka, "There is the theoretical possibility of a nuclear explosion of the plant housing the reactor."



This is the "Tupa," the Teta-Pinch 100-KV system for confinement and heating of plasma by magnetic implosion

He also explains that nuclear fusion comes from the reaction of light atom fusion, such as that of hydrogen atoms (deuterium and tritium) and lithium. That process releases no radioactive product, nor is there the possibility of an explosion, there being, therefore, in the opinion of the scientist, greater safety by comparison with nuclear fission.

Another point of comparison to be emphasized refers to the problem of the fuels required by each process; the greater or lesser degree of difficulty in obtaining the raw materials. In this aspect, nuclear fission depends on uranium, which although abundant "in world terms," is found only in some countries, which brings up questions of monopolies of the mineral with all its consequences. On the other hand, fuels used in the fusion process--hydrogen and lithium--are found almost everywhere.

Professor Sakanaka estimates that world reserves of uranium are enough for 500 years of use, providing, he says, that the fast breeder reactor is developed, and also if all countries are producing energy by means of the nuclear fission process in the near future. In that respect, the energy path using fission with uranium as a fuel, presents a limited horizon. As for fusion, Sakanaka declares: "There is no limit whatsoever."

In terms of energy production, that is, greater or lesser efficiency of a process by comparison with the other, as far as the production of energy is concerned, it is still very difficult to make a comparison, which has to be made, according to the UNICAMP physicist, on the basis of costs for the amount of energy produced. This difficulty weighs more against nuclear fusion because it is a project in the scientific demonstration phase and because no reactor suitable for the process has been developed yet. When that happens, its real costs can be established and, subsequently, there will be bases for establishing comparative advantages.

Generally, Professor Paulo Hiroshi Sakanaka views the project being executed by UNICAMP and other national institutions with great optimism. He even believes that it is almost certain that the process for obtaining energy through controlled thermonuclear fusion could represent a great hope for resolving the world energy problem in the future, particularly, he recalls again, because it does not cause pollution, does not bring the danger of reactor explosion, and finally, because it is based on a practically inexhaustible source of fuel. In that respect, he believes "Brazil should intensify research in that sector with much more vigor," particularly because the country also presents one advantage: It has considerable reserves of niobium to be used in the superconductor (possible component for the fusion nuclear reactor) and there is much world interest in that material, particularly by Japan. That certainly could make viable a cooperation between the two countries in the technological area, considering that Japan is among the most advanced centers in nuclear fusion research.

8908
CSO: 5100/2224

BRIEFS

COST OF SEAMLESS TUBING--Brasilia--Over the next 3 years, NUCLEBRAS [Brazilian Nuclear Corporations] will spend $50 million to manufacture seamless tubing for sheathing the pellets of enriched uranium that will be used in the nuclear fission process, according to a statement yesterday by Jose Diniz de Souza, chairman of ELETROMETAL Fine Steels, Incorporated, the firm responsible for producing the tubes. According to Jose Diniz, ELETROMETAL developed the technology for manufacturing the seamless tubes over the past 2 years and is now in a position to supply the demand from the nuclear sector both for strategic components and for reactive materials such as titanium, zircaloy, and hafnium. He said that the domestic production of those components by ELETROMETAL means that the government will not have to import technology and corresponds to the objectives for which ELETROMETAL was established in 1972: "to produce a number of strategic materials in Brazil. The strategy for achieving that objective was worked out in close cooperation with the Armed Forces, chiefly through the Aerospace Technology Center (CTA) and the Army Research and Development Institute." [Text] [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 8 Jul 82 p 31] 11798

CAMPO DE ROMA RESEARCH CENTER--Cesar Cals, minister of mines and energy, said on Friday that before the end of this year, he is going to propose that the Federal Government establish the National Plasma Physics Center. In principle, it is to be set up in Campo de Roma in Rio de Janeiro, near Itaguai, where Brazilian scientists will conduct further research in the nuclear field. It will coordinate the studies currently being carried out by eight university groups in Rio de Janeiro, Sao Paulo, and Rio Grande do Sul and by the Aeronautics Institute in cooperation with the CNEN (National Nuclear Energy Commission). The minister, who was delivering a lecture at the War College, said that the center will be the means of preparing Brazil to enter the closed club of nations possessing nuclear fusion technology. "All the industrialized countries are exchanging information because they have not yet mastered the technology. On the day when they do master it, they will sell their research. That is why Brazil wants to join the club--to gain access to information and prepare our group." Concerning the Brazilian-German nuclear agreement, the minister explained that it talks about the construction of eight nuclear power plants but stipulates only that the first four will be built in partnership with the KWU. The other four will be the object of international bids. [Text] [Rio de Janeiro GAZETA MERCANTIL in Portuguese 3-5 Jul 82 p 10] 11798

CSO: 5100/2215

CHIEF OF STATE OPENS URANIUM PROCESSING PLANT

Libreville L'UNION in French 10 Jun 82 pp 1, 4

[Excerpts] Equipped with a pumping station built on the Likedi River to supply 600 m^3 of industrial water per hour, 3000 m^3 capacity receiving vats linked by metal pipes 4 m long and 350 cm in diameter, storage areas for 2,400 tons, grinding machines, a 1000 kW power partially self-controlled crushing machine, 24 m-diameter thickening apparatus, eight 90 m^3 vats for sulfuric acid treatment, three 70 m^2 band filters for the filtration stage, means for storing 6000 m^3 of uranium liquid, a solvent shop for concentrating and purifying and another one for precipitating by magnesium followed by drying in order to obtain magnesium uranate, COMUF's [Franceville Uranium Mining Company] new uranium processing plant was inaugurated yesterday at Mounana by El Hadj Omar Bongo, president of the republic, who had laid its first sone in May 1980.

With yesterday's opening (Wednesday, 9 June0 of the new uranium processing plant, COMUF reaches the culmination of an investment program announced at the time of its 20th anniversary in August 1975. This program included notably the opening and equipping of the underground factories completed since August 1979, the construction of the new sulfuric acid production facility put into service on 26 January 1982, and finally the assembly of a new uranium processing plant. These details were given out yesterday at Mounana by the second vice prime minister, the minister of mines and petroleum, for whom these achievements are the perfect expression of the climate of understanding and confidence existing between the government and the directors of COMUF.

Worth 15 billion CFA francs, this factory, thanks to which COMUF will from now on process 450 thousand tons of ore instead of 300 thousand and will produce 1,500 tons of uranium metal annually (our 8 June edition), will make this company an organization well-equipped, at least on the level of material means of production, to confront the risks and challenges of the future, according to Mr Mouvagha Tchioba.

This portion of the second vice prime minister's speech echoed an earlier statement made by COMUF's chief executive officer, Mr Maurice Delaunay, in which the latter described this modern, supercapacious factory as "a bet on the future made jointly by private investors and the public sector", allowing for a rational exploitation of known reserves.

According to Maurice Delaunay, this remarkable industrial facility was created at the moment when the price of uranium fell 43 percent, and the financial condition of COMUF was compromised by this drop in the selling price of uranium on the world market. It was therefore indispensable to secure bank financing and to appeal to the participation of the work force in a period of austerity; a work force which, according to Etienne Guy Mouvagha must become Gabonese (at least 50 percent of the training personnel) in terms of the professional qualifications and competence of those Gabonese employees chosen to replace expatriates, so that the Gabonese nationalization policy will not be a budget basement version.

The policy of Gabonese nationalization, described in detail by Mouvagha Tchioba as it concerns COMUF, also formed the essence of the brief statement by the president of the republic, who recalled the importance which the government and the Gabonese Democratic Party (PDG) attach to its application in all private and public companies. The chief of state continued his speech in the Bateka language, exhorting the people of Mounana to work even harder.

9939
CSO: 5100/5675

BRIEFS

DANISH, SWEDISH N-PLANT RISK COMMITTEE--Denmark and Sweden will each have three members on the committee which will be appointed to investigate the risks and consequences of a casualty in the Barseback nuclear power plant. The chairman will be appointed from another Nordic country. That is the result of the Danish-Swedish deliberations which were completed in Stockholm on Friday. Both delegations met on Thursday to deal with the demand from the Danish Minister of Environment Erik Holst for a committee. The committee will meet and prescribe increased safety measures at Barseback. It will also study how nuclear power plants are designed in other countries, and what measures are taken when they are located near other country's national borders or population centers. [Text] [Stockholm DAGENS NYHETER in Swedish 17 Jul 82 p 7] 9287

CSO: 5100/2218

STATUS, EFFICIENCY OF PRESSURIZED WATER REACTORS STUDIED

Paris REVUE GENERALE NUCLEAIRE in French Mar-Apr 82 pp 174-195

[Study by Jean Bernard, Helene Celier, Jean-Claude Le Ralle, Francoise Maubacq, and Francoise Ouvry of the Programs Department, Atomic Energy Commission]

[Excerpts] I As of 1 October 1981, there were 277 nuclear power plant units throughout the world, located in 23 countries. Their net electric power was 157 GW. The United States, with 77 units and 57.5 GW, heads the list, providing 37 percent of the total nuclear power.

France is in second place, with 30 units and 22 GW, providing 14 percent of the power supplied; it is followed by Japan with 25 units, 17 GW, and 11 percent. We should mention that in September 1981, Yugoslavia became a member of the nuclear club.

The percentages supplied by the European Community, the CEMA [Council for Economic Mutual Assistance] countries, and the rest of the world are 27 percent, 11 percent, and 25 percent, respectively.

II The Growth of the French Nuclear Power Plants; Status as of 1 October 1981

2.1. Evolution of the French Nuclear Power Plant Program

In 1970, France selected the PWR [Pressurized Water Reactor] process for its nuclear power plant program, and began a preliminary industrial series consisting of the six 900 MW units located at Fessenheim (two units) and at Bugey (four units).

This decision was further confirmed by the option taken by EDF [French Electric Power Company], in accordance with the goals set by the government, to select for the short and mid-term periods only standardized units of the PWR type developed by

Framatome under a Westinghouse license. This first program (CP-1) led to the industrial development of 18 900 MW units (at the Tricastin, Gravelines, Dampierre, and Le Blayais plants) to respond to the desire to achieve a certain degree of national independence, a desire that was stimulated by the first international oil crisis. A second program (CP-2) covered ten 900 MW units (at the Saint-Laurent, Chinon, and Cruas plants). This was begun while the first industrial series was being completed. A first group of eight 1300 MW units (Paluel, Saint-Alban, and Flamanville plants) was also begun, and the decision was made to start on the second group of eight 1300 MW units (Cattenom, Belleville, Nogent, Golfech, Penly, and Chooz power plants). [See reference 2 in the bibliography]. The growth of French nuclear power (in net GWe) over the course of the years is shown in figure 1b [not included].

2.2. The status of the French Power Plants as of October 1981

After the energy debate last fall, the French government decided to begin six nuclear units in 1982 and 1983. These units would include one 900 MW PWR reactor for Chinon B-4, and five 1300 MW PWR reactors at Cattenom-3, Chooz B-1, Golfech-1, Nogent-2, and Penly-1.

The status of the nuclear program in France in October 1981 appears as follows.

a. There were 30 nuclear power plants in operation in the French power system, making up a net power of 21.8 GW, distributed as follows:

    1. six UNGG [Graphite-Gas Nuclear Units]
    2. one heavy water-gas reactor
    3. one breeder reactor (Phenix)
    4. one 300 MW PWR reactor
    5. 21 900 MW PWR reactors

Of these 30 units, 25 are in industrial operation and produce a net power of 17.3 GW*.

b. 25 nuclear power plant units are under construction (this means that the order for the execution of the nuclear boiler has been given to the manufacturer, Framatome). These units represent a net power of 27.3 GW, and are distributed as follows:

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* As of 1 January 1982, 28 units were in industrial operation, providing a net power of 20.1 GW.

1. 12 900-MW PWR reactors
2. 12 1300-MW PWR reactors
3. 1 breeder reactor (Super-Phenix)

c. There is one nuclear unit whose order of execution for the nuclear boiler was scheduled to be issued in December 1981* (Belleville-2). This is a 1300-MW PWR reactor, representing a net power of 1.3 GW.

d. Six units are scheduled to be started in 1982 and 1983. These units will provide a net power of 7.3 GW, distributed as follows:

   1. one 900-MW PWR reactor
   2. five 1300-MW PWR reactors

2.3. Start of France's 900-MW PWR Plants and Contribution of the Nuclear Power Plants to Electricity Production

A detailed account of the start of the 900-MW PWR plants has been given by EDF and Framatome [see references 3 and 4 in the bibliography].

The curve showing the rise in power of France's nuclear power plants (figure 1b) clearly illustrates the significant impact of the successive start of service of the preliminary series (the first unit was connected in April 1977) and of the industrial series (the first units of the CP-1 and CP-2 programs were connected in March 1980 and January 1981, respectively. The first unit of the 1300-MW PWR series is scheduled to start in 1983.

Figure 2 shows the evolution of the percentages of conventional thermal power, hydroelectric power, and nuclear thermal power in the production of electricity during 1980-1981. We should observe that nuclear power rose from 16.4 percent at the beginning of 1980 to 23.5 percent at the end of that year, and reached 37.7 percent in 1981. This indicates the value of France's nuclear power program for the generation of electricity and for our energy independence. Figure 3 summarizes the entire French situation as of 15 October 1981, along with the establishment of the various power plants on French territory.

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* The order of execution was actually given on the scheduled date.

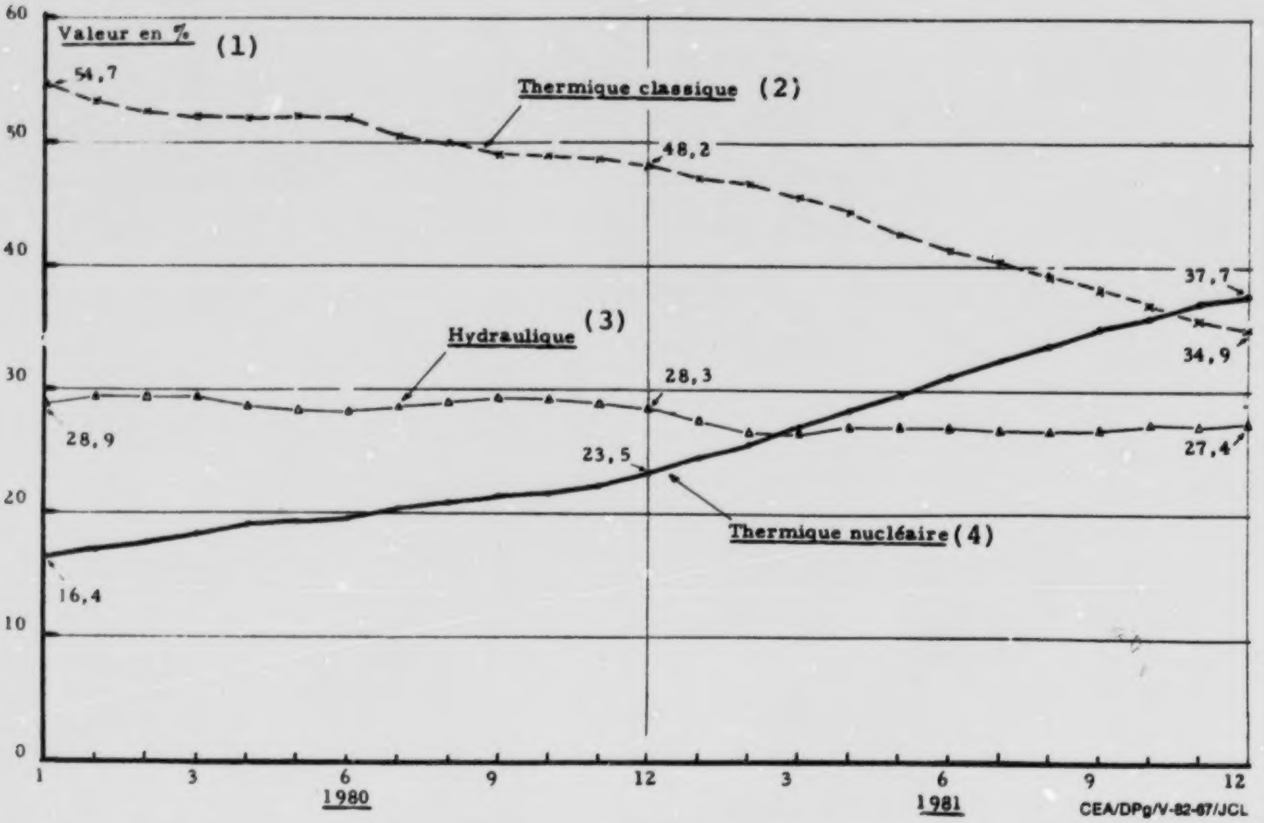

Figure 2: France: Evolution of the percentages of different sources in electricity production (based on 12 months, completed at the end of each month considered).

Key:

1. Value in percentage
2. Conventional thermal power
3. Hydroelectric power
4. Nuclear thermal power

III Statistical Analysis of Operation of the PWR Reactors in the World and in France as of 1 October 1981

As the ordinary water process is the essential component of the French nuclear power program, the CEA [Atomic Energy Commission] periodically conducts a statistical analysis of the operation [see references 5 and 6 in the bibliography] of this type of reactor, using data from the Elecnuc* data bank, which is designed to follow the operation of the nuclear power plants throughout the world and the changes in the international market for nuclear power units.

3.1. Parameters Considered

The coefficient of energy utilization, K, defined as the ratio between the electricity really produced by the facility and the energy it would have produced if it had operated without interruption during the entire period under consideration, at its nominal power, forms one of these parameters:

$$K = \frac{\text{gross electric energy produced}}{\text{gross nominal power of the facility} \times \text{duration of the period considered}}$$

This coefficient, K, may be expressed by a number (less than or equal to 1) or by a percentage. But the operation of a nuclear power unit can also be expressed in a different way, for example, by using the number of hours of operation equivalent to a continuous operation at full power (HEPP [Hours Equivalent at Full Power]), or sometimes even by using JEPP [Days Equivalent at Full Power], producing the same number of kWh, or quantity of electrical energy, as the real operation.

Based on the known and published values of the gross monthly electricity production, the elementary data available for nuclear power units in countries with a market economy all over the world, the operation of each unit may be characterized by K for different given periods. Then it is possible to make a statistical analysis of the operation of a set of n nuclear units, by calculating more closely the value of the arithmetic mean $\overline{K}$ of the units considered, the standard variation σ of the values of K in relation to $\overline{K}$, and the median value K_m which divides all the K values arranged in order of magnitude in two identical groups, possibly along with other parameters to try to refine the analysis.

The study covers the operation of PWR reactors of nuclear power plants for each 12-month period starting from a given date, the date of the first connection of each facility to the power system. By using this method, the behavior of the various sets of units can be examined during the initial phase of their operation in the electrical power system.

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* Sold on the European CISI [Expansion unknown] system.

In France, the MSI [Start of Industrial Service] takes place only after the level guaranteeing an operation at nominal power is achieved: unfortunately, that is not always the case in all other countries. In fact, the contractual or regulatory aspect of the conditions of start of industrial service (or start of commercial operation) differs from one country to the next, and sometimes from one unit to the next.

3.2. Description of the Global Sample and Results

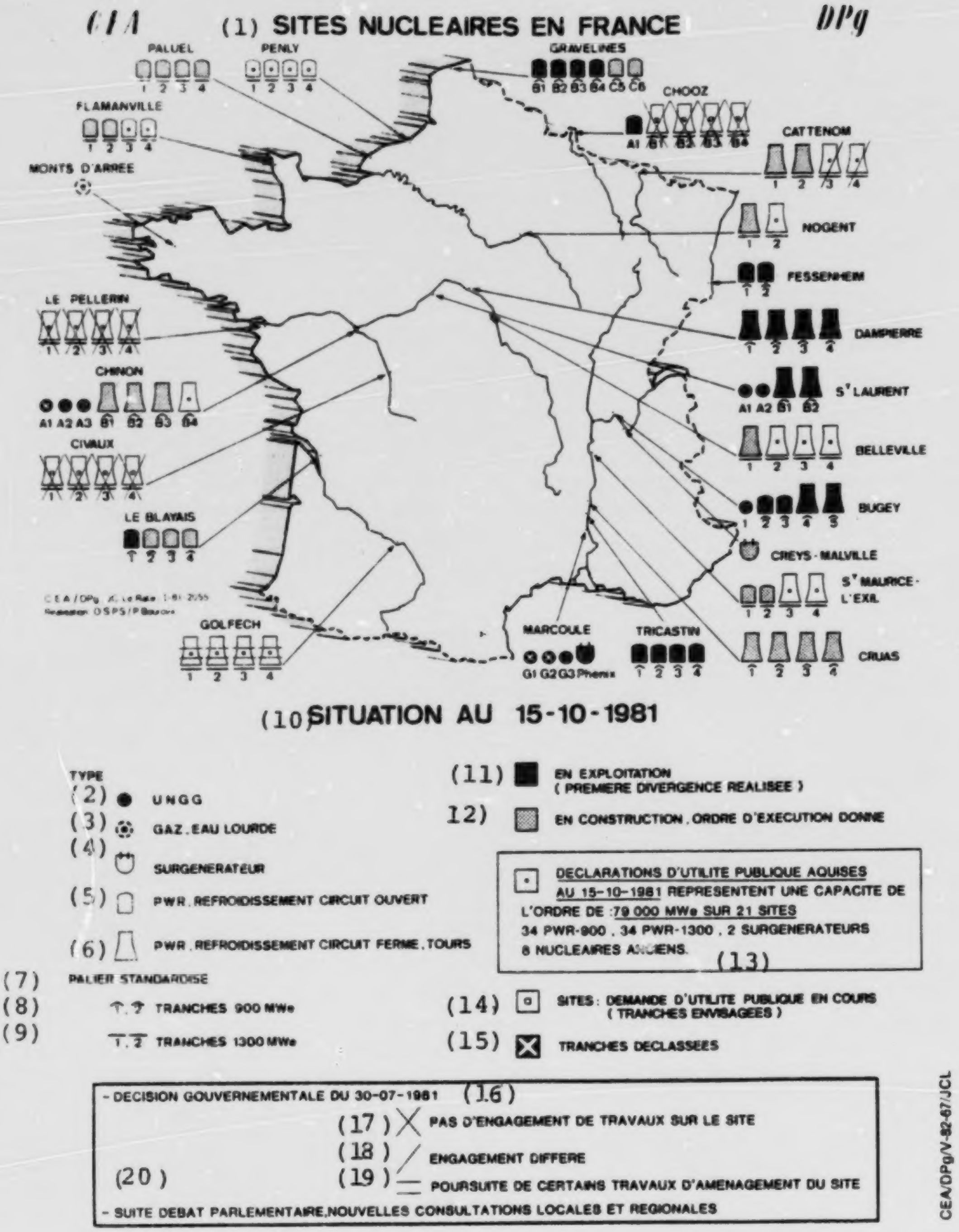
The global sample includes all of the nuclear power units equipped with PWR reactors developed under license from manufacturers in market economy countries (Babcock and Wilcox, Combustion Engineering, and Westinghouse in the United States, and KWU-Siemens in the Federal Republic of Germany), whose gross electric power is superior or equal to 300 MW, and which had been in service for over 12 months by the date of 1 October 1981.

This sample is examined by making a classification into industrial generations of nuclear groups, using criteria based on the thermal power, the number of fuel assemblies, and the number of loops of the primary circuit.

3.3. Examination of Results

a) No matter what group is being considered in the global sample, there is some dispersion (values of σ) of the individual K coefficients. This dispersion is relatively significant and approximately equal to that found in the preceding studies, although the number of units included in the study has increased. It does appear, though, that when only the groups of the second industrial generation are considered (Table VIII), the Framatome units have standard variations that may be a little smaller, but because of the low values of n in the second and third, fourth and fifth periods, this conclusion can not be considered significant and definitive. Nonetheless, these results are satisfactory and encouraging for Framatome. Later studies made of larger groups will provide a better basis for comparison of the various manufacturers.

b) The arithmetic means $\overline{K}$ of the first period of operation differ significantly from those of the following periods. This can be explained perfectly by the variations in operation during the test period and the start of service. This result is valid no matter what group is being considered.



CEA
(1) SITES NUCLEAIRES EN FRANCE
DPg
PALUEL 1 2 3 4
PENLY 1 2 3 4
GRAVELINES B1 B2 B3 B4 C5 C6
CHOOZ A1 B1 B2 B3 B4
FLAMANVILLE 1 2 3 4
CATTENOM 1 2 3 4
MONTS D'ARREE
NOGENT 1 2
FESSENHEIM 1 2
LE PELLERIN 1 2 3 4
DAMPIERRE 1 2 3 4
CHINON A1 A2 A3 B1 B2 B3 B4
S' LAURENT A1 A2 B1 B2
BELLEVILLE 1 2 3 4
CIVAUX 1 2 3 4
BUGEY 1 2 3 4 5
LE BLAYAIS 1 2 3 4
CREYS - MALVILLE
S' MAURICE - L'EXIL 1 2 3 4
CEA/DPg
GOLFECH 1 2 3 4
MARCOULE G1 G2 G3 Phenix
TRICASTIN 1 2 3 4
CRUAS 1 2 3 4
(10) SITUATION AU 15-10-1981
TYPE
(2) ● UNGG
(3) GAZ. EAU LOURDE
(4) SURGENERATEUR
(5) PWR. REFROIDISSEMENT CIRCUIT OUVERT
(6) PWR. REFROIDISSEMENT CIRCUIT FERME. TOURS
(7) PALIER STANDARDISE
(8) 1. 2 TRANCHES 900 MWe
(9) 1. 2 TRANCHES 1300 MWe
(11) EN EXPLOITATION (PREMIERE DIVERGENCE REALISEE)
12) EN CONSTRUCTION. ORDRE D'EXECUTION DONNE
DECLARATIONS D'UTILITE PUBLIQUE AQUISES AU 15-10-1981 REPRESENTENT UNE CAPACITE DE L'ORDRE DE :79 000 MWe SUR 21 SITES
34 PWR-900 , 34 PWR-1300 , 2 SURGENERATEURS
8 NUCLEAIRES ANCIENS.
(13)
(14) SITES: DEMANDE D'UTILITE PUBLIQUE EN COURS (TRANCHES ENVISAGEES)
(15) TRANCHES DECLASSEES
- DECISION GOUVERNEMENTALE DU 30-07-1981 (16)
(17) PAS D'ENGAGEMENT DE TRAVAUX SUR LE SITE
(18) ENGAGEMENT DIFFERE
(19) POURSUITE DE CERTAINS TRAVAUX D'AMENAGEMENT DU SITE
(20)
- SUITE DEBAT PARLEMENTAIRE,NOUVELLES CONSULTATIONS LOCALES ET REGIONALES
CEA/DPg/V-82-67/JCL

Figure 3: The French Nuclear Power Program as of 15 October 1981.

Key for Figure 3:

1. Nuclear sites in France
2. Graphite-gas nuclear unit
3. Gas-heavy water
4. Breeder
5. PWR-open circuit cooling
6. PWR-closed circuit cooling in towers
7. Standardized level
8. 900 MW units
9. 1300 MW units
10. Status as of 15 October 1981
11. Operating (has gone critical)
12. Under construction; order of execution given
13. Statement of public utility issued by 15 October 1981. Represents a capacity of about 79,000 MW on 21 sites. 34 900 MW PWR; 34 1300 MW PWR; two breeders; eight old nuclear units.
14. Sites: public utility applied for (work begun).
15. Units stopped
16. Government decision of 30 July 1981
17. No work started on site
18. Start of work delayed
19. Some site preparation work continued
20. After parliamentary debate, new local and regional meetings

c) For the first period, the values of the arithmetic means $\overline{K}$ decrease from the first generation to the second and to the third generations. For the other periods, only the values of the first generation are higher than those of the second and third generations, which do not differ much from each other.

For the relation between the factor of energy utilization K and the power P (increasing with the generation), a statistical examination of the results for the three generations of the first period would give a correlation coefficient ($r = -0.274$) and a regression line $K = 63.08-(2.02/100).P$ (figure 4) if in the first approximation all of the K values had a gaussian distribution. But an analysis of the distribution (figure 5a) shows that the distribution has a humped appearance and consequently, the preceding regression line is not necessarily valid. However, if this distribution is separated into two parts with a gaussian appearance corresponding to a first group of 29 units with a $\overline{K}$ equal to 25.1 percent and a second group of 52 units with a $\overline{K}$ equal to 58.3 percent, the search for a correlation between K and P will be negative for the correlation coefficients are too low ($r_1 = -0.101$ and $r_2 = -0.107$); thus the regression lines of each of these groups (see figure 4) are not significant. So it is difficult at this time to attempt to link the evolution of K to the power. In fact, this sample includes, in quantities varying according to the generations, units which are still the first of their series. In addition, a number of regulatory and behavioral constraints (in the United States, after the Three Mile Island accident) have limited the operation of some units, particularly the most recent, during their first periods of operation.

d) For the complete sample and the industrial generations, the mean values of $\overline{K}$ obtained on 1 October 1981 remain close to the value found in the preceding study, with the data available on 1 September 1980, which had shown a systematic decline in the values of $\overline{K}$ in relation to the studies done in early 1979 and during 1978.

This decline may be attributed to the TMI (Three Mile Island) accident and may be only temporary, as figure 5b would seem to suggest. The mean $\overline{K}$, which was about 70 percent for the period preceding TMI, after dropping to about 55 percent, has moved back up to 60 percent for the second 12-month period following the accident, for reactors all over the world.

e) The first generation is characterized by reaching a stable operating regime in three successive phases (first period, then second, third, followed by the fourth period and following periods). This result is comparable to that found in the preceding studies, using the international sample which consisted essentially of units of this first generation.

The mean values of $\overline{K}$ in the second and third generations are lower than those of the first generation, and therefore, the stable operating regime is reached more rapidly. This is certainly an effect of the constraints brought about by the TMI accident on the American reactors, whose weight in the global sample is quite significant.

f) In France, in order to draw up the reference operating hypotheses, the CCPEON [Advisory Commission for the Production of Electricity of Nuclear Origin] used the earlier studies prepared by the CEA for 1978 and 1979. In the international sample available for these studies, the weight of the first industrial generation was relatively large (36 percent and 32 percent). Because of its selection of having the operating regime reached in three phases, the CCPEON agreed that the evolution of operation of the first generation could be extended to the second

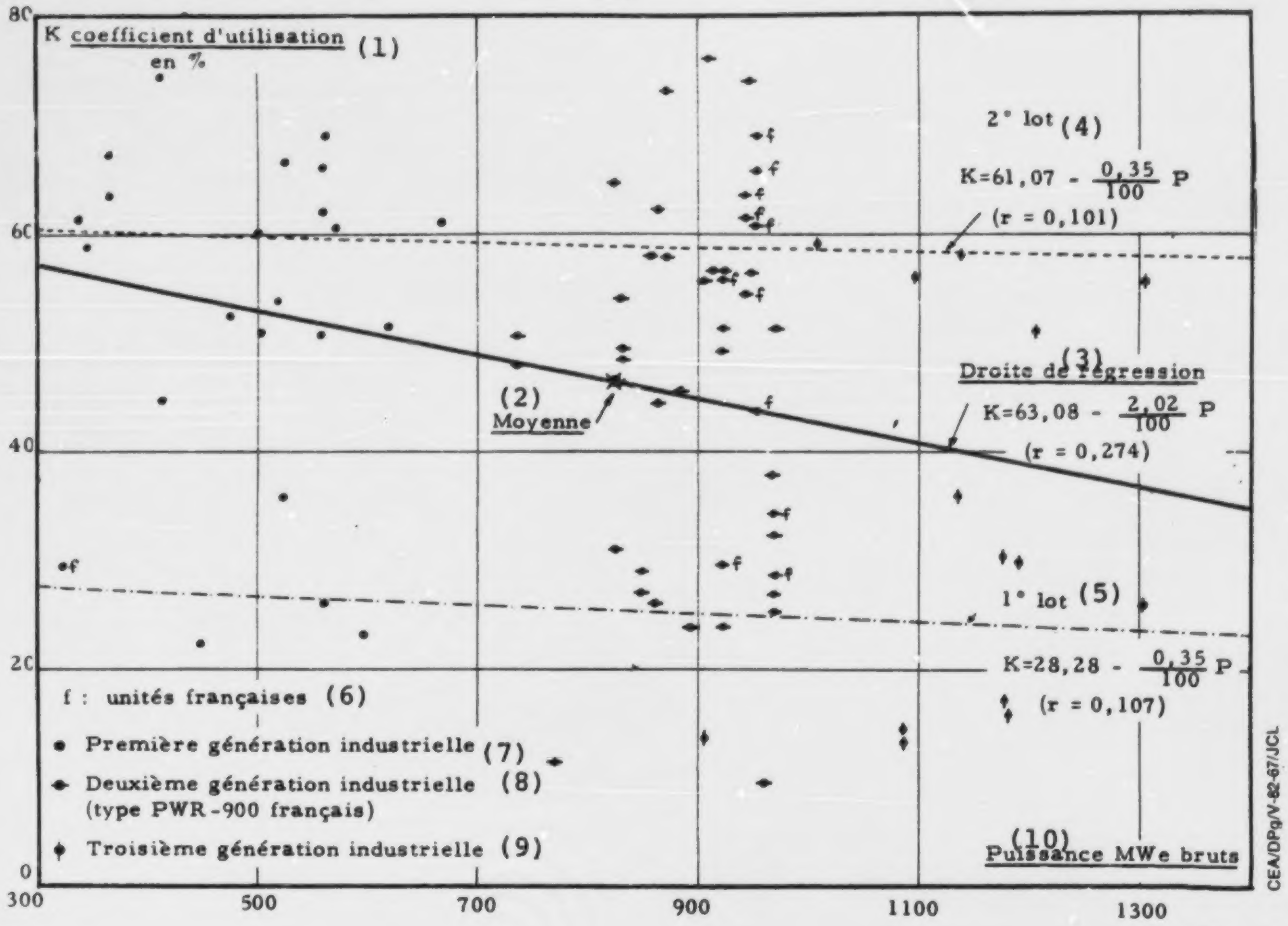


Figure 4: PWR process. Coefficient of energy utilization and gross electric power. First year of operation after connection to the system (81 units on 1 October 1981).

Key:

1. Utilization coefficient
2. Mean
3. Regression line
4. second group
5. first group
6. French units
7. First industrial generation
8. Second industrial generation (900 MW PWR French type)
9. Third industrial generation
10. Gross power in MW

and third industrial generations connected to the power system. During the second generation, with groups that were still quite small, the comparison between manufacturers was favorable to the French firm, Framatome. The results obtained do not indicate that the hypotheses used for reaching operating regime should be questioned in any way.

For the French group of 900 MW PWR reactors, the mean values of $\overline{K}$ obtained (table IX) are higher than or close to the values found in the 1978 and 1979 studies. But the numbers n are still too small in the latest periods for any definitive conclusions to be reached.

	French 900-MW PWR	Framatome	CEA Studies 1978-1979
first period	51.6%	52.0%	45.7%
second period	67.7%	64.2%	60.5%
third period	62.2%	65.7%	60.5%
fourth period	70.1%	74.4%	60.8%

These results place the French units in a very good position in terms of the rest of the world and seem to confirm the wisdom of this three-phase approach to reaching operating regime, at least for the time being.

The current expansion of the French PWR reactors (11 units in the sample on 1 October 1981, and another ten units in their first year of operation at that date), consisting of standardized units, should soon enable us to determine a mean annual utilization coefficient for the French system, which could include certain features particular to France's units, but still without ignoring the information that can be learned from a technically close international sample.

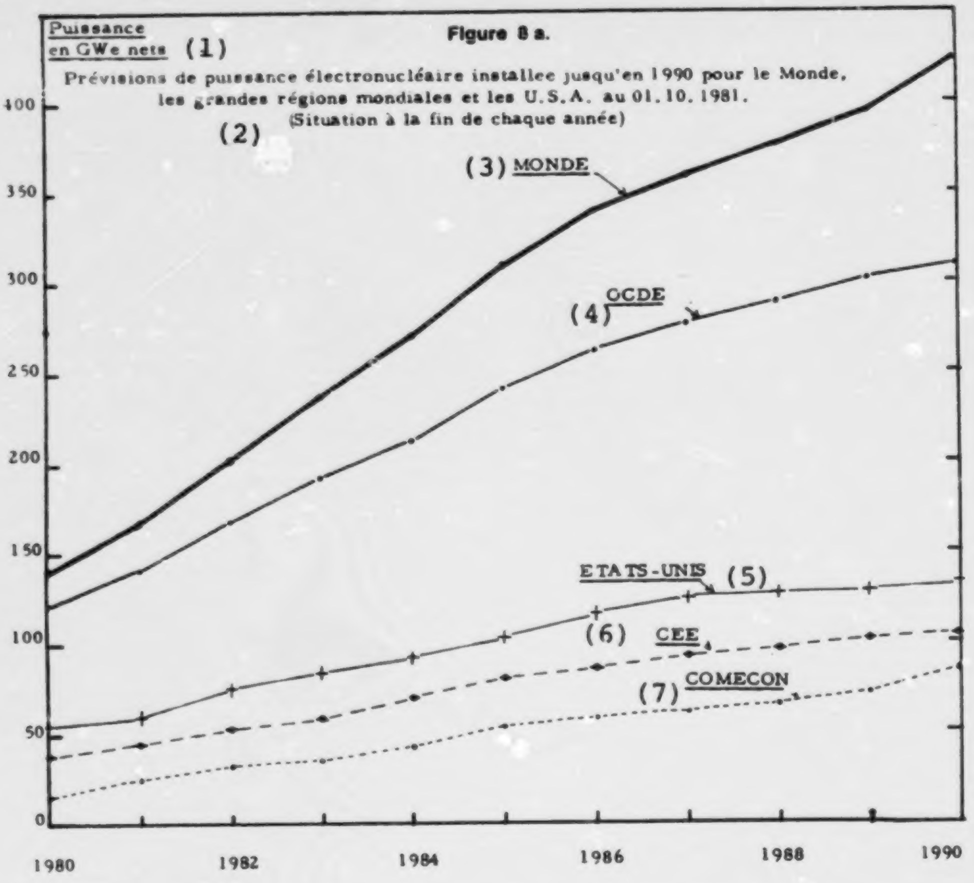
IV Construction Times for Nuclear Power Units Throughout the World

Study of France's Reactors

Table XI summarizes for France the durations 1, 2, 3, and 4 of the various phases of completion of 900 MW and 1300 MW PWR plants. Based on this table, it does appear that a very definite improvement (from 85 to 67 months on the average) came about from 1977 to 1981. This is also illustrated in figure 6 for the 900 MW PWR reactors (average duration d3). This improvement indicates a certain degree of mastery due to the effect of standardization

Figure 8 a.

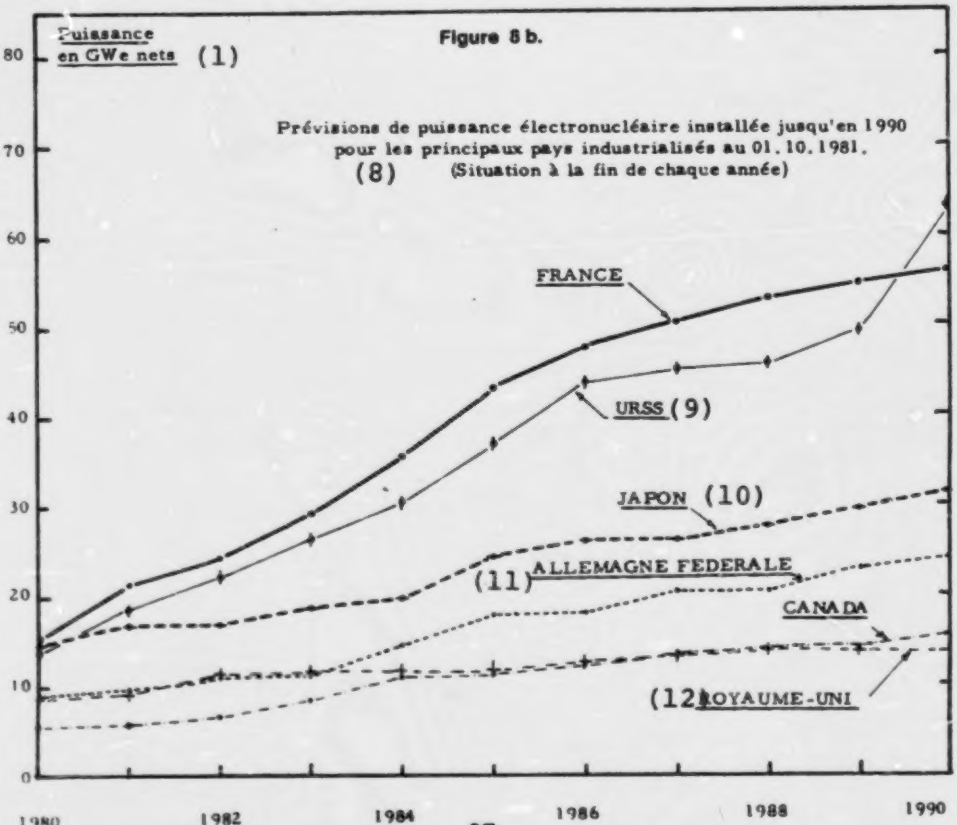
Prévisions de puissance électronucléaire installee jusqu'en 1990 pour le Monde, les grandes régions mondiales et les U.S.A. au 01.10.1981. (2)
(Situation à la fin de chaque année)



CEA/DPg/V-82-67/JCL

Figure 8 b.

Prévisions de puissance électronucléaire installée jusqu'en 1990 pour les principaux pays industrialisés au 01.10.1981. (8)
(Situation à la fin de chaque année)



CEA.DPg.V-82-67 JCL

Key for Figures 8a and 8b:

1. Power in net GW
2. Forecasts for nuclear power until 1990 for the world, the major regions of the world, and the United States, as of 1 October 1981. (Status at the end of each year).
3. World
4. OECD [Organization for Economic Cooperation and Development]
5. United States
6. EEC [European Economic Community]
7. CEMA [Council for Economic Mutual Assistance]
8. Forecasts for nuclear power until 1990 for the major industrialized countries, as of 1 October 1981. (Status at the end of each year).
9. USSR
10. Japan
11. Federal Republic of Germany
12. United Kingdom

(the standard level concept), and the effect of the centralization of preparation and execution, along with the experience acquired. The duration of construction is gradually tending to reach the value of 60 months, which is an industrial performance of some interest when we refer to foreign construction periods (figure 6). The record of construction and start of service of the 900 MW units has been given in detail by EDF [see reference 2 in the bibliography]. It is still too early to express an opinion about the duration of construction of the 1300 MW PWR plants.

V Forecasts for the Worldwide and French Power Plant Programs

Short-term Forecasts (approximately a decade)

These forecasts may be made in a relatively precise manner, based on the status of projects now under construction, and on the projects on order or about to be ordered.

Figures 8a and 8b show the evolution of net installed powers predicted from 1980 to 1990. These predictions are based on the Elecnuc data bank which follows projects now under construction or on order. Figure 8a covers the world, the OECD, the EEC, the CEMA, the United States, while figure 8b covers the Federal Republic of Germany, Canada, France, Japan, the United Kingdom, and the USSR. Figures 8a and 8b meet figures 1a and 1b, which gave the past evolution of the various nuclear programs, at the year 1980.

Table V: Breakdown by manufacturer of the nuclear boiler (or nuclear component) of the units installed as of 1 October 1981 throughout the world, for the major nuclear processes used.

(1) **Filière (GWe nets) (Nbre d'unités)**	(2) **Constructeur**	(3) **(Pays)**	(4) **Puissance installée en GWe nets**	(5) **Nombre d'unités**	(6) **Nombre de pays**	(7) **Licence d'origine**
(8) PWR (87,5 GWe) (123 unités)	Westinghouse	(Etats-Unis) (17)	33,1	46	9	Westinghouse
	Framatome	(France)	20,1	23	2	Westinghouse
	Union Soviétique (13)		9,0	22	5	Union Soviétique
	Babcock et Wilcox	(Etats-Unis)	7,9	9	1	Babcock et Wilcox
	K.W.U.	(RFA) (18)	6,7	8	3	K.W.U. - Siemens
	Combustion Engineering	(Etats-Unis)	6,5	8	1	Combustion Engineering
	Mitsubishi	(Japon) (19)	4,2	7	1	Westinghouse
(9) BWR (40,4 GWe) (63 unités)	General Electric	(Etats-Unis)	26,8	42	9	General Electric
	ASEA-Atom	(Suède) (20)	6,0	9	2	ASEA-Atom
	K.W.U.	(RFA)	3,1	4	1	General Electric
	Toshiba	(Japon)	3,1	4	1	General Electric
	Hitachi	(Japon)	1,2	2	1	General Electric
	Allis Chalmers	(Etats-Unis)	0,05	1	1	Allis Chalmers
	Union Soviétique		0,05	1	1	Union Soviétique
(10) PHWR (6,2 GWe) (15 unités)	A.E.C.L.	(Canada)	5,8	13	3	A.E.C.L.
	K.W.U. - Siemens	(RFA)	0,4	2	2	Siemens
(11) Graphite-gaz (11,5 GWe) (40 unités)	Constructeurs U.K. (14) (AGR et Magnox)	(Royaume-Uni) (21)	8,8	33	3	Constructeurs U.K.
	Constructeurs français (UNGG) I5)	(France)	2,7	7	2	Constructeurs français
(12) RBMK (9,3 GWe) (22 unités)	Constructeurs soviétiques (16)		8,5	21	1	Constructeurs soviétiques
	Burns et Roe-Kaiser Engineers	(Etats-Unis)	0,8	1	1	U.S.A.E.C.

Key:

1. Process (net GWe) (Number of units)
2. Manufacturer
3. Country
4. Installed power in net GWe
5. Number of units
6. Number of countries
7. Original license
8. PWR (87.5 GW) (123 units)
9. BWR [Boiling Water Reactor] (40.4 GW) (63 units)
10. PHWR (6.2 GW) (15 units)
11. Graphite-gas (11.5 GW) (40 units)
12. RBMK (9.3 GW) (22 units)
13. Soviet Union

14. UK manufacturers (AGR and Magnox)
15. French manufacturers (UNGG)
16. Soviet manufacturers
17. United States
18. Federal Republic of Germany
19. Japan
20. Sweden
21. United Kingdom

Note: The values are rounded off. The value of the sum may be different from the sum of the values rounded off.

Table XII provides a basis for a comparison between different forecasts of installed power in 1990, determined either from figures 8a and 8b, or from data from government organizations. These estimates (the second column of figures) are generally higher than the data from the Elecnuc data bank, which cover only projects which have reached at least the stage of being ordered. In the third column of table XII are given CEA/DPg [programs department] estimates, made as part of a longer term projection (up to 2000), based on official government forecasts and also on the known or foreseeable possibilities of development in the various countries concerned.

VI General Conclusion

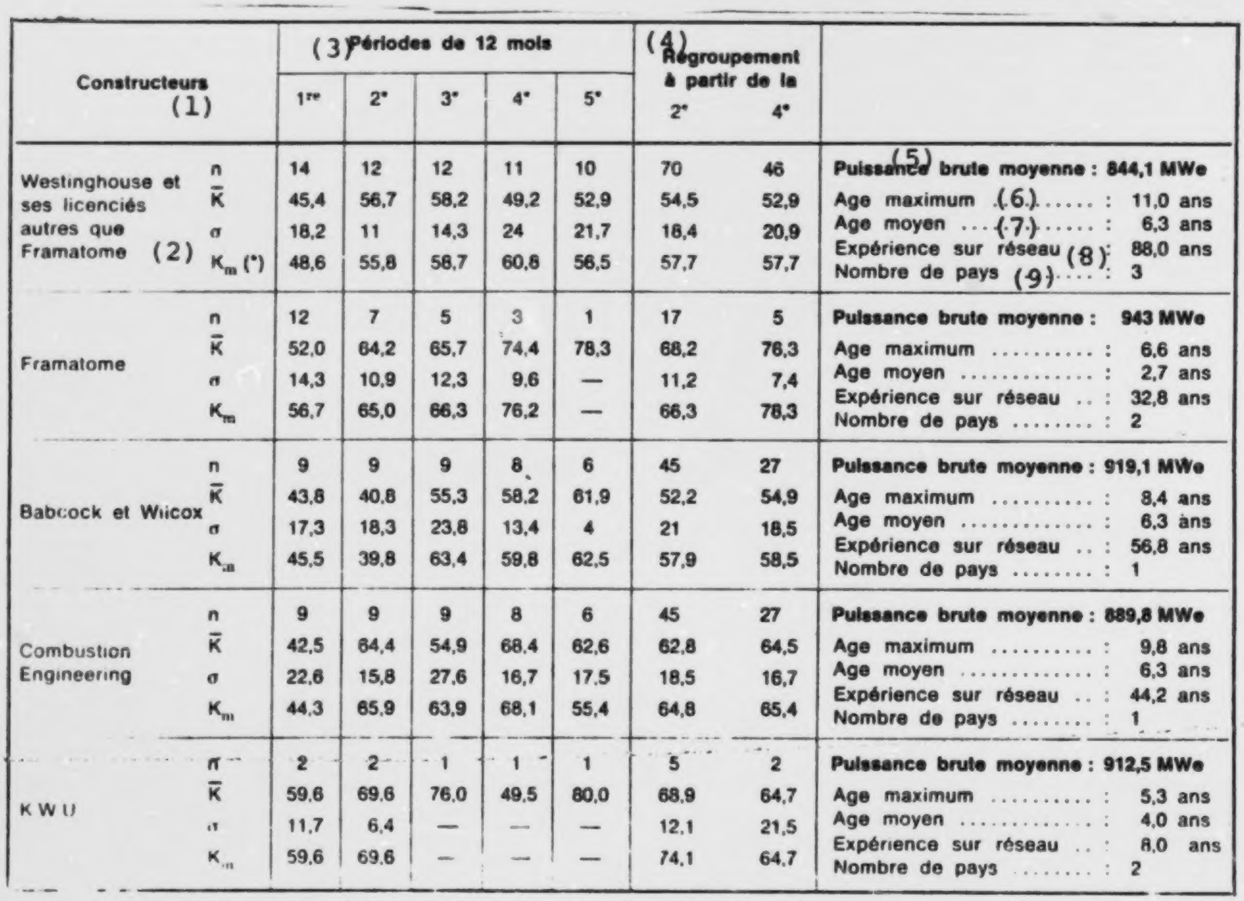
At the end of 1981, France was in second place in the world, behind the United States, with a total installed power of 22 GWe.

The completion of the first phase of the nuclear program, which began in 1970, has made this position possible, and has helped to make France more energy-independent. This first phase was completed without any excessive delays.

The statistical analysis done for all of the PWR reactors now in operation has shown satisfactory and encouraging results for the French manufacturer, Framatome. The French units of the 900 MW level will in the near future provide a homogenous group which can be analyzed independently, from the point of view of operation. This will not mean, however, that the technically close reactors in the rest of the world will be ignored. A comparison with the hypotheses selected by the CCPEON may be made.

The current construction times further reveal the good position of France and the positive effect of the standardization of the CP-1 and CP-2 programs.

Table VIII: Values of $\overline{K}$ and σ, by manufacturer, for the second industrial generation, expressed in percentages.



Constructeurs (1)		(3) Périodes de 12 mois					(4) Regroupement à partir de la		
		1re	2^{e}	3^{e}	4^{e}	5^{e}	2^{e}	4^{e}	
Westinghouse et ses licenciés autres que Framatome (2)	n	14	12	12	11	10	70	46	**Puissance (5) brute moyenne : 844,1 MWe**
	$\overline{K}$	45,4	56,7	58,2	49,2	52,9	54,5	52,9	Age maximum (6) ...... : 11,0 ans
	σ	18,2	11	14,3	24	21,7	18,4	20,9	Age moyen ... (7) ...... : 6,3 ans
	K_m (*)	48,6	55,8	58,7	60,8	56,5	57,7	57,7	Expérience sur réseau (8) : 88,0 ans Nombre de pays (9) .... : 3
Framatome	n	12	7	5	3	1	17	5	**Puissance brute moyenne : 943 MWe**
	$\overline{K}$	52,0	64,2	65,7	74,4	78,3	68,2	78,3	Age maximum .... : 6,6 ans
	σ	14,3	10,9	12,3	9,6	—	11,2	7,4	Age moyen .... : 2,7 ans
	K_m	56,7	65,0	66,3	76,2	—	66,3	78,3	Expérience sur réseau .. : 32,8 ans Nombre de pays .... : 2
Babcock et Wilcox	n	9	9	9	8	6	45	27	**Puissance brute moyenne : 919,1 MWe**
	$\overline{K}$	43,8	40,8	55,3	58,2	61,9	52,2	54,9	Age maximum .... : 8,4 ans
	σ	17,3	18,3	23,8	13,4	4	21	18,5	Age moyen .... : 6,3 ans
	K_m	45,5	39,8	63,4	59,8	62,5	57,9	58,5	Expérience sur réseau .. : 56,8 ans Nombre de pays .... : 1
Combustion Engineering	n	9	9	9	8	6	45	27	**Puissance brute moyenne : 889,8 MWe**
	$\overline{K}$	42,5	64,4	54,9	68,4	62,6	62,8	64,5	Age maximum .... : 9,8 ans
	σ	22,6	15,8	27,6	16,7	17,5	18,5	16,7	Age moyen .... : 6,3 ans
	K_m	44,3	65,9	63,9	68,1	55,4	64,8	65,4	Expérience sur réseau .. : 44,2 ans Nombre de pays .... : 1
KWU	n	2	2	1	1	1	5	2	**Puissance brute moyenne : 912,5 MWe**
	$\overline{K}$	59,6	69,6	76,0	49,5	80,0	68,9	64,7	Age maximum .... : 5,3 ans
	σ	11,7	6,4	—	—	—	12,1	21,5	Age moyen .... : 4,0 ans
	K_m	59,6	69,6	—	—	—	74,1	64,7	Expérience sur réseau .. : 8,0 ans Nombre de pays .... : 2

(*) K_m Valeur médiane qui partage l'ensemble des valeurs K rangées par ordre de grandeur en deux lots identiques en nombre (10)

Key:

1. Manufacturers
2. Westinghouse and its licensees other than Framatome
3. 12-month periods
4. Regrouping after the: 2nd; 4th
5. Gross average power
6. Maximum age
7. Average age
8. Experience on the power network
9. Number of countries

10. K_m = median value which divides all the values of K arranged in order of magnitude into two groups identical in number.

Based on the forecasts as of 1 October 1981, by 1990 France should be in competition with the Soviet Union for second place in the world, behind the United States, and preceding Japan and the Federal Republic of Germany.

(1) **Tranches PWR 900 françaises ayant plus d'un an d'exploitation sur le réseau**

Nom des tranches (2)	(6) Première période	(7) Deuxième période	(8) Troisième période	(9) Quatrième période	(10) K cumulé au 1er octobre 1981	(11) Age en années
Fessenheim 1	29,8	76,3	66,3	64,0	58,8	4,5
Fessenheim 2	56,8	61,0	75,8	76,2	67,5	4,0
Bugey 2	28,5	65,0	56,0	—	47,4	3,4
Bugey 3	34,1	75,0	50,8	—	54,8	3,0
Bugey 4	63,4	65,0	—	—	69,4	2,6
Bugey 5	61,4	63,7	—	—	63,8	2,2
Gravelines B-1	43,2	—	—	—	57,1	1,6
Dampierre 1	54,7	—	—	—	56,5	1,5
Tricastin 1	60,9	—	—	—	62,7	1,3
Tricastin 2	65,7	—	—	—	66,9	1,1
Gravelines B-2	68,8	—	—	—	63,6	1,1
Regroupement (3)	Première période	Deuxième période	Troisième période	Quatrième période	(12) Valeurs regroupées à partir de la deuxième année	
Nombre de tranches	11	6	4	2	12	
$\overline{K}$ (4)	51,6	67,7	62,2	70,1	66,3	
Ecart type σ (5)	15,0	6,4	11,1	8,7	8,3	
K_m (*)	56,8	65,0	61,1	70,1	65	

L'expérience cumulée sur le réseau des unités ayant plus d'un an au 01-10-1981 est de : 26,2 ans. (13)

(*) K_m = Valeur médiane qui partage l'ensemble des valeurs K rangées par ordre de grandeur en deux lots identiques en nombre. (14)

Table IX: French 900 MW PWR Reactors in operation for over 1 year. Values (in %) of $\underline{K}$ and K accumulated for each unit. Values (in %) of $\overline{K}$, and K_m for the entire group of reactors, by period.

Key:

1. French 900 MW PWR units in operation for over 1 year.
2. Name of units
3. Grouping
4. Number of units
5. Standard variation σ

6. First period
7. Second period
8. Third period
9. Fourth period
10. K accumulated as of 1 October 1981
11. Age in years
12. Values grouped starting with the second year
13. The cumulative experience in the power system of units in operation for over 1 year as of 1 October 1981 is 26.2 years.
14. K_m = median value which divides all the values of K arranged in order of magnitude into two groups identical in number.

Table X: Values of K (in %) and Ages of the French 900 MW PWR Units in Operation for less than 1 Year

Tranches PWR - 900 françaises ayant moins d'un an (1) d'exploitation sur le réseau		
(2) Nom des tranches	Valeur de K pour la période entre (3) couplage et 1er octobre 1981	(4) Age en années au 1er octobre 1981
Dampierre - 2	70,3	0,8
Gravelines B - 3	53,0	0,8
St-Laurent B - 1	17,2	0,7
Dampierre - 3	65,0	0,7
Tricastin - 3	71,1	0,6
St-Laurent B - 2	11,1	0,3
Le Blayais - 1	31,3	0,3
Tricastin - 4	33,3	0,3
Gravelines B - 4	35,4	0,3
Dampierre - 4	38,7	0,1

Key:

1. French 900 MW PWR units in operation for under 1 year
2. Name of units
3. Value of K for the period between connection and 1 October 1981
4. Age in years on 1 October 1981

Table XI: Construction Time for French PWR Units (in months)

Nom de la centrale (1)	Filière (2)	Durée 1 (3)	Durée 2 (4)	Durée 3 (5)	Durée 4 (6)	
FESSENHEIM 1	FR/PWR	2	77,14	85,94	87,95	
FESSENHEIM 2	FR/PWR	0	71,19	76,51	76,51	
BUGEY 3	FR/PWR	13,56	69,65	74,41	87,98	
BUGEY 2	FR/PWR	1,54	77,27	86,63	**88,18**	Bugey 2 et 3
BUGEY 4	FR/PWR	0	66,06	69,38	69,38	
BUGEY 5	FR/PWR	3,94	62,98	68,1	72,04	
DAMPIERRE 1	FR/PWR	4,89	66,69	72,31	77,2	
GRAVELINES B-1	FR/PWR	1,87	69,38	77,83	79,7	
TRICASTIN 1	FR/PWR	0	73,85	79,93	79,93	
TRICASTIN 2	FR/PWR	7,88	68,2	72,04	79,93	
GRAVELINES B-2	FR/PWR	9,92	66,79	70,07	80	
DAMPIERRE 2	FR/PWR	12,84	67,35	69,58	82,43	
TRICASTIN 3	FR/PWR	14,85	67,38	70,37	85,22	
DAMPIERRE 3	FR/PWR	18,89	62,98	66,82	85,71	
GRAVELINES B-3	FR/PWR	16,88	63,37	68,99	85,88	
GRAVELINES B-4	FR/PWR	0	58,41	61,99	61,99	
LE BLAYAIS 1	FR/PWR	25,83	60,35	64	89,88	(7)
TRICASTIN 4	FR/PWR	19,87	66,36	70,01	89,88	12 commandes
SAINT-LAURENT B-1	FR/PWR	22,86	58,71	68,04	**90,9**	fermes
SAINT-LAURENT B-2	FR/PWR	0	53,97	59,99	59,99	C.P. 1 - 900
DAMPIERRE 4	FR/PWR	0	58,54	64,95	64,95	
LE BLAYAIS 2	FR/PWR	0	64,95	68,96	68,96	
CHINON B-1	FR/PWR	15,4	64	69,02	84,43	
CHINON B-2	FR/PWR	18,39	65,01	68,99	87,39	(8)
LE BLAYAIS 3	FR/PWR	23,42	62,02	65,97	89,39	4 commandes
LE BLAYAIS 4	FR/PWR	25,45	63,93	67,94	**93,4**	fermes
CRUAS 1	FR/PWR	0	63,01	68	68	C.P. 2 - 900
PALUEL 1	FR/PWR	18,39	74,02	81,01	99,41	
CRUAS 2	FR/PWR	0	62,02	66	66	
PALUEL 2	FR/PWR	22,43	76,97	82	104,44	
CRUAS 3	FR/PWR	0	60,02	64,03	64,03	
PALUEL 3	FR/PWR	31,4	74,02	78,98	110,39	
CRUAS 4	FR/PWR	0	60,02	64	64	(8)
GRAVELINES C-5	FR/PWR	0	60,58	64,52	64,52	4 commandes
SAINT-MAURICE 1	FR/PWR	40,37	70,01	76,05	**116,43**	fermes
FLAMANVILLE 1	FR/PWR	0	72,01	78,06	78,06	C.P. 1 - 1300
GRAVELINES C-6	FR/PWR	0	59,99	64	64	
PALUEL 4	FR/PWR	0	69,02	73	73	
SAINT-MAURICE 2	FR/PWR	0	68	71,98	71,98	
CATTENOM 1	FR/PWR	7,76	71,55	77,53	69,78	
FLAMANVILLE 2	FR/PWR	0	68,96	72,96	72,96	
CATTENOM 2	FR/PWR	0,82	68,96	72,96	73,79	
CHINON B-3	FR/PWR	5,51	59,99	64	69,51	
BELLEVILLE 1	FR/PWR	5,84	67,94	73,92	79,77	

Key for Table XI:

1. Name of plant
2. Process
3. Duration 1
4. Duration 2
5. Duration 3
6. Duration 4
7. 12 firm orders
8. Four firm orders

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CSO: 5100/2181

FIRST REPORT ON COST OF HANDLING SPENT NUCLEAR FUEL ISSUED

Stockholm DAGENS NYHETER in Swedish 2 Jul 82 p 22

[Article by Ingvar Andersson]

[Text] The total cost of handling waste from the Swedish nuclear power program will be 32 billion kronor.

This was the estimate of the Swedish nuclear power industry, as announced by its organization the Swedish Nuclear Fuel Supply Company (SKBF) in a report presented to the State Board for Nuclear Fuel Disposal (NAK).

This cost includes the total waste-disposal program--transport, final storage, and dismantling of nuclear power plants.

The cost is calculated in terms of 1981 monetary value and corresponds to 10 percent of the revenues from nuclear power plants.

The nuclear power industry estimates that the last waste canister will be buried around the year 2060.

The money is being generated through a special fee--presently 1.7 ore per kilowatt-hour--on the price of energy. The money is kept in funds by the nuclear power companies. Since 1976 when money for waste disposal first was set aside in the funds, a total of 2 billion kronor has been collected.

Director general Gerhard Rundquist of the State Board for Nuclear Fuel Disposal (NAK), which is the Industry Department's organ for such issues, told DAGENS NYHETER he believed that the nuclear power industry's calculations were correct:

"The nuclear power industry has made a thorough and detailed study of all conceivable costs," Rundquist said.

No Details

"With regard to the repositories, transports, and plant dismantling we can estimate the costs quite well and I have no doubt that the figures are correct," Rundquist said.

"There is some uncertainty, however, when it comes to the future operating costs. It is difficult to calculate what it will cost to operate waste facilities for 40 to 50 years through the 2060's when the site will be abandoned."

"During that time no new revenues will be generated if needed. There will be only expenditures."

The report from the nuclear power industry may be seen as the first thorough survey of nuclear waste disposal.

It "contains everything" according to the Industry Ministry--the quantity of waste, the number of ship transports, timetables for dismantling nuclear power plants, plans for various storage sites, etc.

Still, it is not a detailed report: On the contraversial topic of where the final storage will be located the report indicates "a site 600 km north of Stockholm and 150 km from the coast."

Wilhelmina?

If circles are drawn according to these instructions they intersect around Wilhelmina, but the nuclear power industry stated that this merely was an example upon which to base economic calculations.

During the remaining years of the 1980's, 10 to 20 rock formations will be examined and their crack formations studied. During the nineties, some of these sites will be studied in detail and early in the year 2000 construction on the site will begin.

In addition to the main requirement of structural integrity, the site must be within reasonable distance of a harbor and either be located near a railroad line or be on a site suitable for construction of a railroad.

The report to the Industry Minister also contains a survey of recent research on nuclear waste.

This survey indicates that the nuclear power industry is examining the possibility of using plutonium as a fuel in Swedish reactors. If this fuel is used, Sweden would have access to relatively large quantities of plutonium. Plutonium can be mixed with uranium to form so-called MOX (mixed oxide) fuel. For some time experiments with this fuel have been underway at the Oskarshamn I nuclear reactor. The nuclear power companies believe that it will be possible to use the plutonium fuel mixture in Swedish reactors during the late eighties.

9336
CSO: 5100/2207

SWEDEN

BRIEFS

NUCLEAR-PLANT DISASTER PLAN LACKING--"At present we have no viable emergency plan for a possible accident at a nuclear power plant, even though it has been 10 years since the first nuclear power unit went into operation. The state must improve preparedness for accidents at nuclear power plants as soon as possible." This was written by the local safety board at the Ringhals nuclear power plant in a letter to the government. "The division of responsibility for rescue work following an accident at a nuclear power plant has not been established," said Allan Hyden, chairman of the safety board. The roles of the police and the provincial government also remain unclear. "The present system with officers on duty at the provincial government offices is unsatisfactory. Instead, emergency preparedness should be maintained by the officer on duty at the Varberg Police Department." Allan Hyden also pointed out that doctors doubt that the iodine tablets distributed to people living near Ringhals would be of any value following an accident at a nuclear power plant. Recently the siren at Ringhals has sounded several false alarms which, according to the safety board, has undermined public confidence in the alarm. "It also is remarkable that the planned training of personnel in the vicinity of the power plant has been postponed because the state and the local authorities cannot agree on who should pay for the training," Allan Hyden said. [Text] [Stockholm DAGENS NYHETER in Swedish 2 Jul 82 p 22] 9336

CONCERN OVER N-PLANT SAFETY--All nuclear power plants in Sweden lack special medical preparedness measures for those living nearby. Despite frequent careful readiness plans there is no organization for medical personnel to provide assistance at assembly places in the event of a nuclear power accident. Several doctors in Varberg are now reacting against this, and want a plan set up for the Ringhals nuclear power plant. "As the person directly responsible for medical preparedness in northern Halland it is my duty to inform the politicians about the poor situation which exists for the 7,000 who live within 10 km of Ringhals," said Professor Herbert Sunzel in Varberg. Next month, therefore, medical personnel, county councillors and administrators will meet in Varberg to lay the foundation for a program for medical preparedness for a possible accident at Ringhals. The medical resources existing today are limited to the personnel at Ringhals, and this applies also to the other three nuclear power plants in Sweden. [Text] [Stockholm SVENSKA DAGBLADET in Swedish 17 Jul 82 p 7] 9287

CSO: 5100/2218 END

JPRS 81572

18 August 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 158

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18 August 1982

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 158

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NUCLEAR-FREE PUSH, VICTORIAN N-SHIP BAN STIR CONTROVERSY

Labor Party Divisions

Canberra THE AUSTRALIAN in English 14 Jun 82 p 1

[Article by Russel Schneider]

[Excerpts]

Clear divisions emerged within the ALP at the weekend over controversial questions of nuclear power.

The splits open up the possibility of at least two early elections — in South Australia and federally.

In Sydney, the NSW branch of the party delivered a strong rebuff to Victoria's Premier, Mr Cain, when it overwhelmingly rejected a left-wing call for the party to oppose the berthing in Australian ports of warships carrying nuclear weapons.

But in South Australia, moderates suffered a number of defeats, and the party convention adopted a report recommending a ban on nuclear-powered vessels.

The issue is now certain to come to a head at the party's national conference in Canberra next month, with the Left trying to have the Victorian ban made official national policy.

If this happens, the Prime Minister, Mr Fraser, is likely to call a snap double dissolution and run an election campaign on the defence issue.

Despite the strong wins by moderates in NSW, the party's decisions at the conferences open up the prospect of the South Australian Premier, Mr Tonkin, calling a snap poll, followed by a federal election — both on the nuclear power issue.

Hayden Policy

Canberra THE AUSTRALIAN in English 15 Jun 82 p 1

[Excerpt]

THE Leader of the Opposition, Mr Hayden, was rebuffed by the Queensland branch of the ALP yesterday when he opposed a move to declare Queensland a nuclear-free State.

Mr Hayden pointed out a federal Labor pledge to accept the porting of nuclear-powered navy ships.

The Queensland ALP conference, meeting in Brisbane, voted to support declaring the State nuclear-free.

The resolution was moved by the deputy Leader of the State Opposition, Mr D'Arcy, and supported by the socialist left-old guard faction.

Mr Hayden affirmed a federal Labor commitment, made in 1976, to accept nuclear-powered naval vessels as long as they were not involved in the stockpiling of nuclear arms or in nuclear hostilities.

He said supporters of the motion were wasting their time if they thought it would preclude visits by nuclear-powered naval vessels. State governments did not have the constitutional power to restrict or regulate the movement of these vessels.

Mr Hayden was backed by the Leader of the State Opposition, Mr Casey, the State party president, Dr Denis Murphy, and the State secretary of the Australian Workers Union, Mr Errol Hodder.

The Queensland ALP decision follows a similar declaration by the Labor Government in Victoria and a ban by South Australia's State Labor branch on visiting nuclear-powered ships.

But although the resolution was carried, party officials said it would not become State Labor policy. This was because it was raised at a conference called to debate rule changes rather than policy issues, and was over-ridden in parts by federal ALP policy.

In other developments yesterday on the nuclear arms issue:

- The director of the Queensland National Party, Mr Mike Evans, said he thought the party was likely to oppose the porting of nuclear-armed ships in Australia in peace time;
- Mr Evans said he understood the Prime Minister, Mr Fraser, had told the US President, Mr Reagan, Australia opposed visits by nuclear-armed ships;
- The Minister for Foreign Affairs, Mr Street, accused the ALP of plotting a deliberate and co-ordinated attempt to isolate Australia from the Western alliance.

Mr Evans' surprise statement has slowed the Federal Government's determined bid to split the ALP on the nuclear weapons question.

It contrasts with earlier statements by Mr Fraser, in which he argued that visits by American warships were vital to the ANZUS alliance.

Mr Fraser has also said the Federal Government accepts the US and Royal Navy policies of refusing to disclose whether their ships are nuclear-armed.

The ALP is under strong pressure from its left wing to ban any visits to Australia by nuclear-armed or nuclear-powered vessels and, if this is adopted as official Labor policy, Mr Fraser is likely to use it as an excuse for a snap federal election.

Victorian Nuclear Prohibitions

Melbourne THE AGE in English 12 Jun 82 p 3

[Article by Bill Birnbauer]

[Excerpt]

The State Government will legislate to prohibit the SEC building nuclear power stations and will discourage exploration for uranium in Victoria.

The Minister for Minerals and Energy, Mr White, said yesterday that the Government intended Victoria to be a nuclear-free State. He said the Government would legislate to allow only nuclear materials intended for medical, scientific or approved industrial purposes to be transported through or within Victoria.

Mr White said the Government would not grant companies or individuals licences, financial assistance or other incentives to explore for or mine uranium. Nuclear reactors, processing and enrichment plants and nuclear waste dumps would not be allowed.

The Victorian Government steered clear yesterday of the argument it is having with the Federal Government on the State Government's intention to ban nuclear-powered and nuclear-armed vessels from Victorian ports. The Prime Minister, Mr Fraser, said on Thursday that the Federal Government would legislate to ensure it could override any State legislation on nuclear vessels.

Mr Cain said he was still considering legal advice from the Solicitor-General on the Commonwealth's powers over defence and treaties. Meanwhile, a pamphlet produced by the Liberal Party's Federal secretariat says the Victorian Government has an electoral death wish on the issue.

It says: "The Victorian ALP clearly has an electoral death wish if it believes the Australian people want to repudiate the USA's guarantee of defence support under ANZUS at a time of increased international tension and instability and of a growing Russian presence in the Indian Ocean. The ALP's anti-American crusade will be seen by Australian voters as a serious threat to the nation's long-term security. An attempt to undermine our whole defence strategy cannot be shrouded under the veil of the 'nuclear-free State' proposal."

The legislation announced by Mr White deals only with the nuclear industry and has nothing to do with shipping. The decision to amend the SEC Act to stop the commission building a nuclear-power plant should end speculation that the SEC was planning to build one at Westernport.

Nuclear-Ship Ban Retraction

Melbourne THE AGE in English 17 Jun 82 p 1

[Article by Philip Chubb]

[Text]

The Victorian Government has bowed to Commonwealth powers on the issue of nuclear ships entering the State's ports.

The Premier, Mr Cain, said yesterday that legal advice received by him indicated that if the Federal Government went ahead with its plan to legislate, this would override any action that could be taken by the State.

Asked if Victoria would initiate a ban pending Federal legislation, Mr Cain said: "All I can say is that I hope the Prime Minister will, as a second leg concurrent with his designed legislation, convey the wishes of the Victorian Government to the appropriate Governments of other countries . . . it's a matter for the Prime Minister. He has now taken this over, as it were."

Mr Cain had previously made several statements flatly asserting that nuclear-armed "or" nuclear-powered vessels would be banned from Victoria's ports.

He said yesterday: "In implementing the policy I have done what I believe is the proper thing—conveyed the wishes of the Victorian Government to the national Government and I believe it should now act accordingly."

He said he did not believe that "any nation with which this country is on friendly terms would wish to be involved" in acting against the Victorian Government's wishes. He said nuclear ships were not wanted in Victorian waters.

He would not make direct approaches to overseas Governments. "The line that I followed in contacting the Prime Minister was the correct one," he said.

The issue has caused a great deal of conflict within the ALP. Asked about the national aspect of the policy, Mr Cain said: "All I can do is repeat what I said before. My job is to implement the policy of the porty."

Mr Cain also attacked the Prime Minister's handling of the issue. He said Mr Fraser had shown "a degree of public dishonesty and disregard for the truth which is even remarkable for him. Mr Fraser now says that the Federal Government will introduce legislation to ensure the visits of these ships. He has never before sought to do so despite similar attitudes to Victoria's by New South Wales and South Australia".

He said that if the Federel Government legislated it "must accept full responsibility for the safety of the people of this State.

Mr Cain said that it had never been Victoria's intention to intrude on the Federal Government's responsibilities for defence and foreign affairs. "What we are insisting upon is that foreign Governments which operate nuclear-powered or nuclear-armed ships pay regard to the concerns of the Victorian Government and Victorian people, as they have in the past in the case of expressions of similar concern in other States," he said.

Mr Cain said Victoria would go ahead and legislate to ban nuclear industry in Victoria. "The Government presently recognises the right of States to act in this area," he said.

"When announcing the results of the review of Commonwealth functions on 30 April 1981, the Commonwealth Government declared that responsibility for nuclear industry should rest with the States, subject to a Commonwealth overview."

Mr Cain said that if the Federal Government now claimed any conflict, it should say so immediately. He said: "Victoria will carry a fight on the exclusion of nuclear industry from Victoria right up to the Prime Minister. He will be challenging not only the right of a State Government to act in this sphere, but the right of a majority of Victorians, as expressed in the last election campaign, to seek to live in an environment free of nuclear hazards."

SA Uranium Mine Go-Ahead

Canberra THE WEEKEND AUSTRALIAN in English 19-20 Jun 82 p 1

[Article by Peter Blunden]

[Text]

THE huge Roxby Downs uranium, copper and gold project will go ahead following a dramatic vote in the South Australian Parliament yesterday which has rocked the Labor movement and guarantees a stormy ALP federal conference on the uranium issue in Canberra next month.

The man whose vote tilted the scales 11-10 in favor of the venture was veteran Labor MP Mr Norman Foster, who resigned from the party on Thursday after alleging harassment and standover tactics by his colleagues.

Rather than boycott yesterday's special parliamentary sitting, as he first intended, Mr Foster turned up for the vote after having been persuaded by 17 federal Labor MPs to defy the State party's opposition to uranium mining, and support the Roxby Downs Indenture Bill.

He defiantly crossed the chamber and voted against his estranged Labor colleagues and the Australian Democrats.

His vote reversed the 11-10 decision to ban the project reached on Thursday morning when Mr Foster opposed the bill.

After the vote, Mr Foster told reporters that 17 federal Labor MPs had telephoned him before the emergency parliamentary session, urging him to support the bill.

This was despite the rigid anti-uranium posture of the South Australian ALP and the Australian Democrats, whose opposition had seemingly ensured Roxby Downs would be indefinitely deferred.

Mr Foster, an ALP member for nearly 40 years, later said he believed there was "a fair intimation" the ALP conference in Canberra next month would change the direction of its uranium policy.

"Politically, it is inevitable for them to change," he said.

His turnabout on the issue will enable Roxby Downs to emerge as one of the nation's biggest mining projects.

A jubilant Premier, Mr Tonkin, said last night: "I am delighted beyond all measure. This is a great day for all South Australians.

"In simple terms of jobs, money and security, it adds a whole new dimension to our economy and to our future.

"I have always believed this project is of such paramount importance for South Australia, it is above political considerations.

"Mr Foster acted with great courage..."

Mr Foster's decision to support Roxby Downs came only 36 hours after he voted along party lines to torpedo the project.

It also came 24 hours after he made public his resignation from the ALP, alleging harassment of himself and his family by ALP colleagues.

Mr Foster was the centre of a storm after revealing on Monday at the State ALP conference he was considering breaking Caucus solidarity and voting for the bill.

He said that shortly before the first vote, both he and his family were threatened with death if the bill passed. He suspected an ALP member was connected with the threat.

He was further disturbed by heckling from Upper House colleagues during his two-hour speech on the issue before the first vote.

Yesterday, as he crossed the floor, he turned to Labor MPs and said: "I supported you the other night, and you rubbished me."

At yesterday's emergency sitting, the President of the Legislative Council, Mr Whyte, was expected to exercise his casting vote to break the 10-10 deadlock had Mr Foster stayed away. In the event, Mr Whyte's tie-breaker was not required.

Roxby Downs is believed to rank among the world's biggest concentrations of minerals to be discovered in 50 years.

NEW TOWN

Preliminary estimates indicate there could be as much as 750 million tonnes of ore, comparable with Mount Isa or the Zambian copper belt.

Early estimates suggest up to 150,000 tonnes of copper being mined a year.

The joint venture partners, Western Mining Corporation and BP Australia, are expected to commit $1000 million to construction. The go-ahead will lead to a new town of up to 9000 people near the mine site.

Had the bill been rejected, the partners — who already have poured more than $50 million into the project — would have shut it down.

It took months of negotiations between the partners and the State Government to hammer out a mutually acceptable bill.

The partners are expected to complete their studies on the project by the end of 1984 and, under the agreement, are committed to spending another $50 million on the feasibility stage.

The companies are expected to commit themselves to mining by no later than 1987, unless it is not economic for them to do so.

In such circumstances, the bill gives them the right to postpone their obligations for successive two-year periods, subject to the overriding right of the minister of mines and energy to refer the question of economic impracticability to an independent expert.

CSO: 5100/7540

PORT AREA SAFETY IN NUCLEAR-SHIP ACCIDENTS MAPPED

AEC-Defense Department Paper

Canberra THE WEEKEND AUSTRALIAN in English 12-13 Jun 82 p 2

[Article by Peter Terry]

[Text]

CONTINGENCY plans have been drawn up for the emergency evacuation of Australia's main ports in the event of an accident or sabotage incident on board a visiting nuclear-powered warship.

This has been done even though the chance of a serious nuclear accident is classed as "extremely remote".

The plans are the result of a joint investigation by the Department of Defence and the Australian Atomic Energy Commission into the risks of allowing the ships to dock in Australia.

The investigation found that there was no chance whatever of an explosion like that of an atomic bomb.

Their report is a classified document — a copy of which was handed to *The Australian* yesterday.

Its release follows the row between the Federal and Victorian Governments over the State Labor Government's decision to declare a nuclear-free zone and ban nuclear vessels.

The report points out that preparations should be ready to cope with the worst possible incident.

That would mean the "urgent and immediate" evacuation of anyone within 600m of the stricken ship, and the possible evacuation of people within a kilometre.

Milk produced within 10km from the ship might also have to be withheld until it was shown to be free from radio-active contamination.

The report said open food markets near the port would have to be closed.

The worst possible accident, in which there were no outside influences, would be a melt-down of the ship's nuclear core.

"The radio-active products released in this manner would be almost completely confined within the reactor containment and hull of the ship," said the report.

"However, there would also be a build-up of pressure within the containment from the high-pressure, high-temperature reactor cooling water escaping from the end of the broken pipes, and flashing into steam.

"The resultant increase in internal hull pressure would cause a small fraction of the fission products to leak slowly out of the hull into the atmosphere over a period of many hours.

"This core melt-down accident, sometimes referred to as a maximum credible accident, has been calculated to have a probability of occurrence of less than 1 in 10,000 per reactor per year."

But there were other accidents that could occur, such as that suffered by a warship if it were involved in a high-speed collision, said the report.

Such a collision could be enough to rupture the containment and reactor area. But the report said the chance of this happening was very unlikely, as any collisions in port were always at low-speeds.

"Therefore the risk is greatest in the approaches to ports where shipping lanes converge, and where there are often densely populated areas nearby on shore," the report said.

"The conditions of entry proposed for visits of nuclear warships include the control of shipping movements in Australian waters to prevent such an accident from occurring near the coastline."

It was conceivable that weapons on board the ship could explode and damage the reactor, but existing safety measures made this possibility extremely remote.

"The efficiency of these arrangements has been demonstrated over the decades by the lack of any known explosion in peacetime in the magazine of a warship in the fleet of any of the major powers."

Potentially more serious than a core melt-down would be an act of sabotage.

But such acts could be prevented by strict security measures.

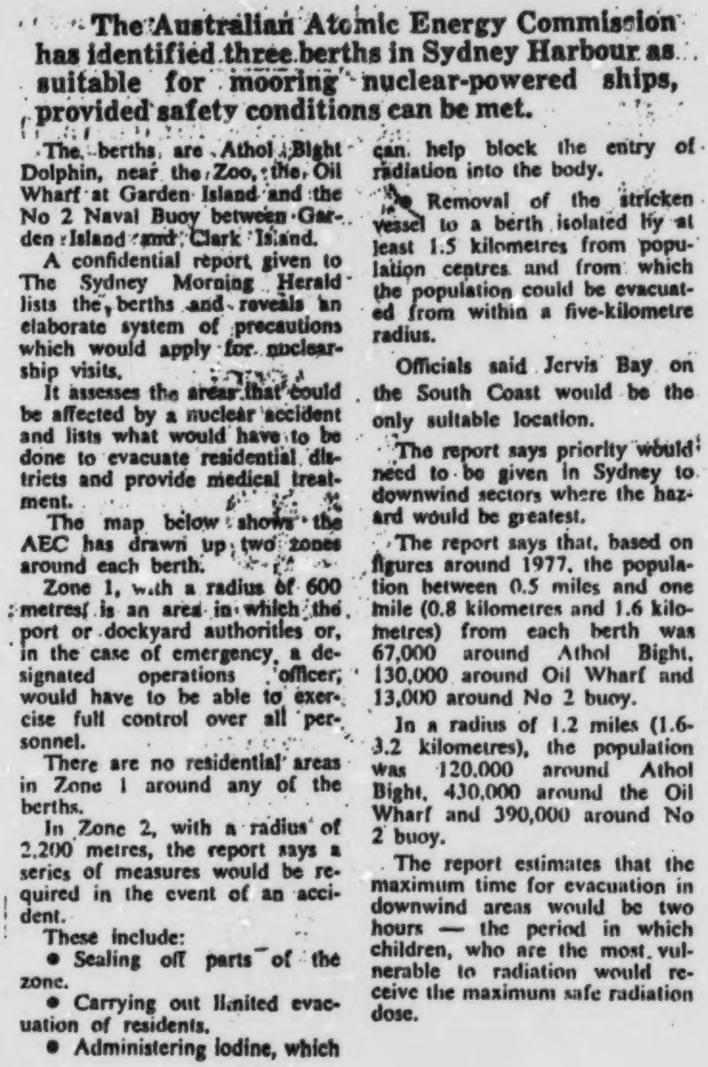
For practical purposes, the fact that each nuclear warship only spent an average of four days in an Australian port made the chances of accidents occurring very slim.

Sydney Evacuation Plan

Sydney THE SYDNEY MORNING HERALD in English 12 Jun 82 pp 1, 4

[Article by Mike Steketee and Paul Kelly]

[Text]



The Australian Atomic Energy Commission has identified three berths in Sydney Harbour as suitable for mooring nuclear-powered ships, provided safety conditions can be met.

The berths are Athol Bight Dolphin, near the Zoo, the Oil Wharf at Garden Island and the No 2 Naval Buoy between Garden Island and Clark Island.

A confidential report given to The Sydney Morning Herald lists the berths and reveals an elaborate system of precautions which would apply for nuclear-ship visits.

It assesses the areas that could be affected by a nuclear accident and lists what would have to be done to evacuate residential districts and provide medical treatment.

The map below shows the AEC has drawn up two zones around each berth.

Zone 1, with a radius of 600 metres) is an area in which the port or dockyard authorities or, in the case of emergency, a designated operations officer, would have to be able to exercise full control over all personnel.

There are no residential areas in Zone 1 around any of the berths.

In Zone 2, with a radius of 2,200 metres, the report says a series of measures would be required in the event of an accident.

These include:

- Sealing off parts of the zone.
- Carrying out limited evacuation of residents.
- Administering iodine, which can help block the entry of radiation into the body.
- Removal of the stricken vessel to a berth isolated by at least 1.5 kilometres from population centres and from which the population could be evacuated from within a five-kilometre radius.

Officials said Jervis Bay on the South Coast would be the only suitable location.

The report says priority would need to be given in Sydney to downwind sectors where the hazard would be greatest.

The report says that, based on figures around 1977, the population between 0.5 miles and one mile (0.8 kilometres and 1.6 kilometres) from each berth was 67,000 around Athol Bight, 130,000 around Oil Wharf and 13,000 around No 2 buoy.

In a radius of 1.2 miles (1.6-3.2 kilometres), the population was 120,000 around Athol Bight, 430,000 around the Oil Wharf and 390,000 around No 2 buoy.

The report estimates that the maximum time for evacuation in downwind areas would be two hours — the period in which children, who are the most vulnerable to radiation would receive the maximum safe radiation dose.

According to Commonwealth sources, the Defence Department used the AEC to prepare the report in 1977 in an attempt to persuade NSW to drop its ban on nuclear-powered ships using the State's ports.

The sources said that the Prime Minister, Mr Fraser, far from being selective in his indignation by attacking the Victorian Government this week for declaring the State's nuclear-free zone, has put a major effort into persuading NSW to drop its policy against the visit of nuclear-powered ships.

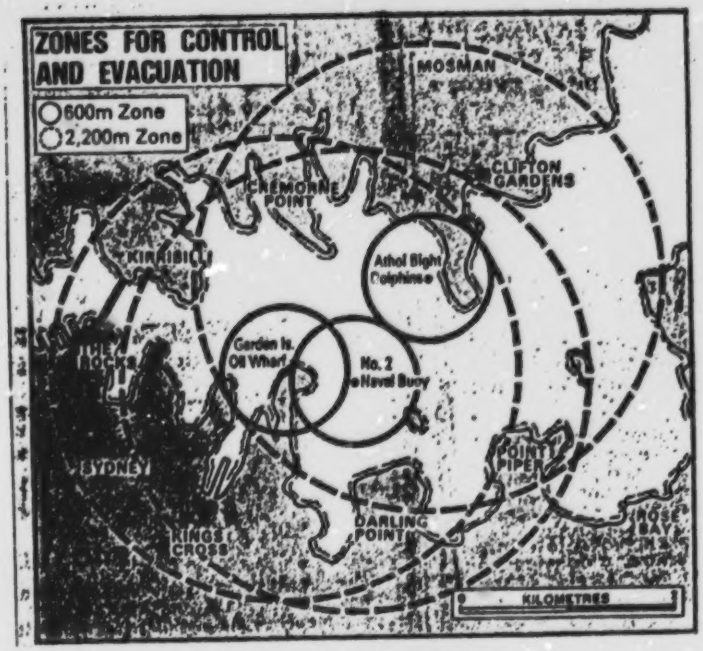
It appears the document may have had the opposite effect, reinforcing NSW policy because of the implications for safety, particularly in Sydney Harbour, of nuclear-powered vessels.

State officials said that, through a number of decisions in recent years, the State Government had extended its policy to refusing to co-operate with the Commonwealth to develop a joint system of regulation of the nuclear industry.

State Cabinet also had decided several years ago against granting any licences to explore for uranium in NSW.

The Premier, Mr Wran, acknowledged yesterday the right of the Commonwealth to allow nuclear-powered ships into the State's ports.

But in brief comments following a speech, he said the Commonwealth also would have to take into account such issues as evacuation and potential tourism.



State officials acknowledge that the likelihood of an accident involving a nuclear vessel is remote. But they said the State's emergency services could not be relied on to put into effect large-scale evacuation and other measures.

In addition, there would be doubts about adequate security around the ships moored in a harbour as busy as Sydney's.

The document also reveals that the Federal Government has developed conditions for visits by a nuclear-powered ship.

These are:

- A visit would be for crew rest and recreation and not for the handling of fuel or repairs to reactors in the ship.
- The vessel could move only during daylight hours, when the visibility was at least 1,200 metres.
- The vessel would have to be moved to a remote anchorage within 24 hours of an accident.
- Tugs or other means of moving the ship would have to be available within one hour of request.
- An approved monitoring and safety organisation would have to exist in the port being visited.

CSO: 5100/7541

NORTHERN TERRITORY BACK IN RACE FOR U-ENRICHMENT PLANT

Sydney THE SYDNEY MORNING HERALD in English 18 Jun 82 p 20

[Article by Brian Johnstone]

[Text]

DARWIN. — The Northern Territory Government is to renew its bid to establish Australia's first uranium enrichment plant.

The Chief Minister, Mr Everingham, said yesterday Cabinet had directed Territory Mines and Energy Minister, Mr Ian Tuxworth, to begin talks with the Federal Government on the issue.

Mr Everingham said, all the other contenders for a uranium industry had been "knocked out of the running."

The Roxby Downs Indenture Bill had been defeated in the South Australian Parliament and the Victorian Premier, Mr Cain, had announced a proposal to declare the State a nuclear free zone, he said.

The Queensland and South Australian Labor Parties followed Victoria's lead at their annual conferences last weekend.

Both States had keenly sought the establishment of a uranium enrichment plant, Mr Everingham said.

A multi-million-dollar feasibility study into the establishment of such a plant in the Iron Triangle region of South Australia is due to conclude soon.

Among the groups carrying out the study are the partners in the proposed Roxby Downs venture, Western Mining Corporation Holdings Ltd and the British Petroleum Australia group.

The Northern Territory Government discussed the possibility of a uranium enrichment plant in 1980 when it studied the feasibility of a nuclear power station in Darwin.

It had appointed an American nuclear energy development expert, Mr Richard Koerner, as an energy consultant and Mr Everingham had made an overseas study tour of nuclear installations.

However, it was decided a nuclear power station would be too costly.

Mr Everingham said that, with the Victorian Government and one of the major political parties in South Australia and Queensland adopting an anti-nuclear line, the Territory was now "the only logical place for this industry, especially as we have the vast majority of the free world's uranium reserves.

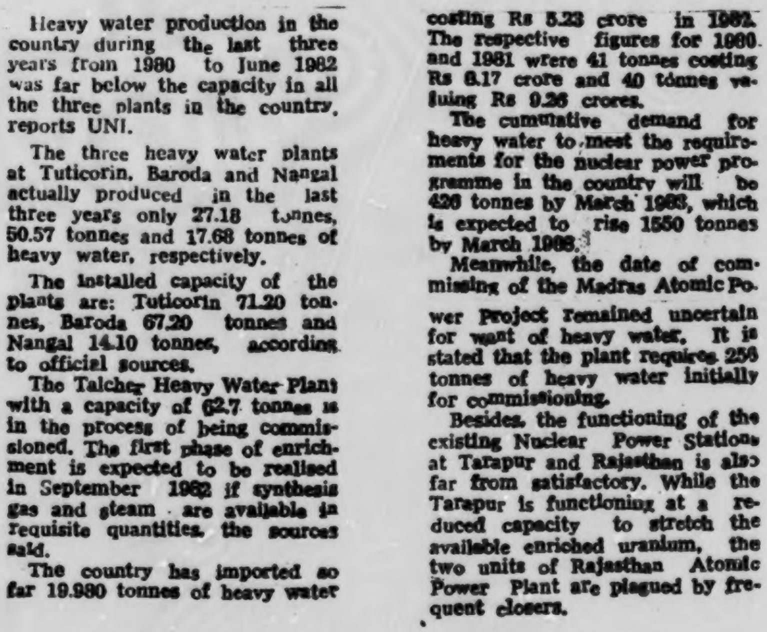
"It is only fair that Territorians and should profit economically and socially by the establishment of a uranium enrichment plant," he said.

CSO: 5100/7541

ACHIEVEMENTS OF DACCA ATOMIC ENERGY CENTER NOTED

Dacca THE BANGLADESH OBSERVER in English 17 Jul 82 p 5

[Text]



Heavy water production in the country during the last three years from 1980 to June 1982 was far below the capacity in all the three plants in the country, reports UNI.

The three heavy water plants at Tuticorin, Baroda and Nangal actually produced in the last three years only 27.18 tonnes, 50.57 tonnes and 17.68 tonnes of heavy water, respectively.

The installed capacity of the plants are: Tuticorin 71.20 tonnes, Baroda 67.20 tonnes and Nangal 14.10 tonnes, according to official sources.

The Talcher Heavy Water Plant with a capacity of 62.7 tonnes is in the process of being commissioned. The first phase of enrichment is expected to be realised in September 1982 if synthesis gas and steam are available in requisite quantities, the sources said.

The country has imported so far 19.980 tonnes of heavy water costing Rs 5.23 crore in 1982. The respective figures for 1980 and 1981 were 41 tonnes costing Rs 6.17 crore and 40 tonnes valuing Rs 9.26 crores.

The cumulative demand for heavy water to meet the requirements for the nuclear power programme in the country will be 426 tonnes by March 1983, which is expected to rise 1550 tonnes by March 1988.

Meanwhile, the date of commissing of the Madras Atomic Power Project remained uncertain for want of heavy water. It is stated that the plant requires 256 tonnes of heavy water initially for commissioning.

Besides, the functioning of the existing Nuclear Power Stations at Tarapur and Rajasthan is also far from satisfactory. While the Tarapur is functioning at a reduced capacity to stretch the available enriched uranium, the two units of Rajasthan Atomic Power Plant are plagued by frequent closers.

CSO: 5100/7129

PROBLEMS IN PRODUCTION OF HEAVY WATER DISCUSSED

Bombay THE TIMES OF INDIA in English 21 Jul 82 p 8

[Article by Jairam Ramesh]

[Text] India's entire nuclear energy programme is in jeopardy because heavy water continues to be unavailable. Heavy water is used both as a coolant and moderator in natural Uranium-fuelled reactors of the type that have been installed at Kota and Kalpakkam and that are proposed for installation at Narora and Karapar. These reactors not only generate power but also produce Plutonium needed for the fast breeder reactors.

The production of heavy water is an extraordinarily complex process. This is so because the initial concentration of Deuterium in the raw material processed is extremely low and a 7000-fold concentration has to be brought about to obtain reactor-grade heavy water. Compounding the complexity is the fact that the in-process inventory in a heavy water plant relative to the production rate is large compared with all other chemical process industries. As a result, heavy water plants are particularly slow to come to equilibrium following a disturbance, however slight, from steady-state operation.

The earliest process to be developed for making heavy water was in Norway in the 1940s and involved the electrolysis of ordinary water. This technique has been adopted in the Nangal heavy water plant that was commissioned in 1962. This process, however, is enormously power-intensive and has long become obsolete.

In the 1950s, parallel developments were taking place in Canada and France to come up with more efficient alternatives to the electrolysis method. The principle behind these developments was the exchange of Deuterium between two different hydrogenous materials, one a gas and the other a liquid. The French developed the Ammonia-Hydrogen process which involved Deuterium exchange between the Ammonia gas and water, while in the Canadian process Hydrogen Sulphide gas took the place of Ammonia.

Testing Ground

In the mid-sixties, India examined both these processes and decided that it would commercialise both of them. But since a number of fertiliser plants were also being planned for at the same time, the French process found greater acceptance. This was as it ought to have been. For after all, Ammonia plants are nothing but plants that manufacture Hydrogen. Thus, three heavy water plants based on this process were planned at Baroda to be linked to GSFC's Ammonia plant and at Talcher to be linked to FCI's Ammonia plant. Another heavy water plant was sanctioned for Kota and this was to be based on the Canadian Hydrogen Sulphide process.

It is important to note here in the light of what went wrong subsequently, that India was the first, and so far only country, to set up commercial-size plants based on the Ammonia-Hydrogen exchange process. It still is the only country in the world where such plants are operating. The only experience the French consultants for the Baroda and Tuticorin plants had with this process was in a 20-tonne per year pilot plant (the West German consultants for the Talcher Plant did not have even this).

In many ways therefore Kota became a testing ground for the commercial viability of this process. The situation with the other process of the Canadians was only slightly better. A commercial 190-tonne-per-year plant based on the Hydrogen-Sulphide process had been commissioned in 1952 in the U.S. When this plant was replicated elsewhere it failed. By 1970 a 400-tonne-per-year plant had been commissioned in Canada. But there was no operating experience for a long time. Thus India took a calculated risk but hedged its bets by going in for both these relatively untested processes at the same time.

Why have the heavy water plants failed to perform as expected? The performance of the Ammonia-based heavy water plant is extraordinarily sensitive to even the minutest variation in the performance of the Ammonia plant itself. A two to three hour breakdown in the Ammonia plant caused, for example, by a voltage dip in power supply even for a fraction of a second, will result in a four to five day stoppage in the heavy water plant.

Ammonia Plants

Unfortunately, the Ammonia plants to which the heavy water plants are linked have themselves been facing all kinds of problems. The coal-based Ammonia plant at Talcher was commissioned in 1979, almost five years after it was originally expected to go on stream. Since then, the plant has been a disaster and has not been able to function at more than 10 percent of capacity. The plant has had almost no power supply from the grid. It is also clear by now that unless an additional boiler and gasifier is installed, the Talcher Ammonia plant is not going to have an adequate supply of steam. Unless funds for this and for a captive power plant are sanctioned immediately, the Talcher plant may as well be written off.

On an annual basis, SPIC's capacity utilisation has touched 70 to 75 percent. But from the heavy water plant's point of view, this is not of much use: for what matters more is continuous and steady production. But because of severe power problems, continuous production for any reasonable length of time has been almost impossible. For the first time since commissioning in 1975, 100 days of continuous production were recorded only early this year.

There are two ways by which the woes of the Tuticorin plant can be mitigated. First, the SPIC Ammonia plant, the heavy water plant and other industries in Tuticorin can pool their resources together and set up a 75-100 MW captive power plant so that they can be free from grid problems. This pooling is essential for it will be very uneconomic for any of these units to go in for captive stations on their own. Second, an additional stream of Ammonia must be installed. Such a second stream will not only fulfill SPIC's own requirements (SPIC today imports Ammonia) but also serve as a standby to the existing stream.

In fact, this is the main advantage of Baroda for the Ammonia plant of GSFC there consists of two streams. Most problems that have plagued the Baroda heavy water plant have little to do with synthesis gas supply. The plant was all set to go into full-scale production when in December 1977 it was ripped apart by an explosion which caused a shut down of the plant for over two years. The explosion was caused by the failure of a small part made of forged steel into which Ammonia at very high pressure was injected. This part was installed at the suggestion of the French consultants in view of the fact that refrigeration in the plant was inadequate. Subsequent tests conducted by Indian engineers established that the design of this block was faulty and workmanship poor. It was a small part, but a critical one. The country paid the price for French shoddiness and DAE's negligence.

Kota Difficulties

The Kota plant based on the Hydrogen-Sulphide process has suffered on two counts: it started off with Canadian collaboration but midway through, the Canadians withdrew as a mark of protest against the peaceful nuclear explosion at Pokhran. This created considerable problems for the plant. The Canadian company responsible for design and engineering just walked off with all the drawings. Designing had to begin all over again in 1975. This has been done by now and the plant is ready. What has however further delayed start-up is the fact that the Kota heavy water plant gets its supply on steam for process heat from the main RAPP reactor units. As is well know, RAPP itself has frequently stopped functioning. The reason for this requires a separate and detailed study. Suffice to say here that since interruptions in the supply of steam to the heavy water plant have become endemic, it might be worthwhile to spend another Rs. 30 crores to install boilers at the heavy water plant itself.

So far the under-performance of heavy water plants has been discussed in the context of the technologies adopted for production. Process problems have been compounded by management mistakes. DAE has been the researcher, engineer, contractor and manager all rolled into one. This should never have happened because the department does not have the capability for detailed process engineering and project management like, for instance, Engineers India Ltd. (EIL). There has been a belated recognition of this lacuna and DAE has asked EIL to do the engineering and management for the 200-tonne-per-year heavy water plant based on the Hydrogen-Sulphide process at Manuguru (AP). The difficulties EIL is having in obtaining the basic process package from DAE is proof enough of DAE's limitations in this regard.

Finally, heavy water plants cannot be run as departmental undertakings. They need to be formed into a separate public sector corporation (as has been done in the case of Uranium mining, rare earths processing and electronics). This will give them clear identity both commercially and managerially and also help in establishing some amount of badly needed public accountability.

CSO: 5100/7125

STATISTICS ON HEAVY WATER PRODUCTION SINCE 1980 GIVEN

New Delhi PATRIOT in English 25 Jul 82 p 5

[Text] The attention of Bangladesh Atomic Energy Commission (BAEC) has been drawn to an article entitled 'Research for better production' by Kazi Zillur Rahman published in The Bangladesh Observer dated July 7, 1982.

The writer in dealing with the total research of the country like ours cannot afford and anomalies which stand in the way of realising the fruits of national research. [as published]

It is true that a poor country like ours cannot afford a huge amount of expenditure on research unless this is fruitful.

BAEC is an autonomous organisation entrusted with the task of carrying out research and development (R&D) programme for peaceful uses of atomic energy in agriculture, medicine, industry, hydrology, etc., to develop technological infrastructure for nuclear power generation, electronics, material sciences, etc. and also to discharge international obligation thereto.

The Atomic Energy Centre, Dacca (AECD) was established in 1964 and is one of the pioneering research laboratories of the BADC which came into being in 1973. Since the beginning, our endeavour has been to build up scientific manpower through training and to formulate R&D programmes in accordance with the national policies of the government. The R&D programmes in modern science like atomic energy are no doubt expensive everywhere in the world. In that context, the AECD is much less expensive as compared to similar organisations elsewhere and is undoubtedly less expensive than other research laboratories of Bangladesh such as BARI, BRRI etc.

As regards the achievements of AECD, Mr Rahman has mentioned only one area of our contribution, namely the "irradiation works." It may be noted here that most of the peaceful uses of atomic energy involve some kind of irradiation e.g. use of ionizing radiations and radioisotopes. But the R&D work is more general in nature. Some of the significant achievements of AECD are given below:

1) The Agriculture Division of AECD (1964-1975) developed a number of high yielding varieties (by irradiation techniques) such as rice (Iratom-24), jute (Atompat-38) etc. The Division became Institute of Nuclear Agriculture (INA), Mymensingh where much more extensive R&D work in agriculture has been carried out with many useful results. As a recognition of these achievements, INA was given Presidential Award in Agriculture in 1981. The Institute has now been transferred to the Ministry of Agriculture.

2) The Radiation Sterilization Techniques initially developed in the AECD are being used for the sterilization of medical products and appliances in Bangladesh and in food preservation in pilot scale.

3) The National Radiation Protection services including calibration and survey of X-ray installations, issuance of permits for procurement of radioisotopes, personnel monitoring services etc. in and outside BAEC are being provided by the AECD.

4) Sophisticated Nuclear Analytical Techniques developed in AECD are being used for material analysis required by different organisations of Bangladesh.

5) In addition to development of electronics equipment, the repair and maintenance services of various sophisticated electronics equipment in and outside BAEC are being constantly offered by AECD.

6) The application of computer science including educational training and services in Bangladesh has its origin in the AECD with the installation of a computer in 1964.

7) The radiography services for non-destructive testing of welded joints of various industrial installations of Bangladesh are being offered by AECD.

8) Material Science Programme has been undertaken to foster the use of local raw materials for preparation of hard and soft magnets, extensively used in electronics equipment.

9) Some of the Science Departments of Dacca University regularly use the AEDC laboratories, the library and workshop facilities for their research in close collaboration with the AECD Scientists.

10) The AECD in general provides basic training opportunities in modern science and its application, using the Van-de-Graaff Accelerator, the irradiation source and other research facilities of the AECD.

A large number of University students have been carrying out their research works leading to M. Sc. and Ph. D for the last 17 years. Post-graduate course in Radiation Physics for DMRD, DMRT, FCPP etc are being conducted on regular basis in the AECD for a long time. In addition, the AECD had the opportunity to organise a number of national and international seminars/ symposia in various fields of science and technology in order to keep abreast the scientific community of Bangladesh with the latest developments in their respective fields.

BAEC has, in addition, a number of nuclear medical centres in Dacc, Chittagong, Rajshahi and Sylhet which are engaged in diagnosis and treatment of complicated diseases in thyroid gland, kidney, liver, spleen and brain mostly using radioisotopes. On an average, four to five thousand patients are being treated annually in each of these Centres, mostly free of cost.

Amongst other activities, BAEC is now setting up a Research Reactor to Savar to produce radioisotopes and develop necessary technological infrastructure to introduce nuclear power in the country.

We agree with the contention of Kazi Zillur Rahman to give priority to applied research in a country like Bangladesh. As far as the BAEC is concerned, it is mostly engaged in applied research programmes relevant to the socio-economic development of the country and in fulfilling these objectives it is also carrying out some basic research necessary for the successful implementation of the applied programmes.

Jamat Ali
Public Relations Officer
Bangladesh Atomic Energy Commission

CSO: 5100/7128

REPORTER TELLS PROBLEMS OF RAJASTHAN NUCLEAR PLANT

Bombay THE TIMES OF INDIA in English 18 Jul 82 p 3

[Text] BOMBAY, July 17.

THE Rajasthan Atomic Power Station (RAPS) at Rana Pratap Sagar, beset with chronic technical snags, seems to have become a drain on the department of atomic energy's money, material and man-power.

The revenue loss incurred for each day of closure of the station has been worked out at Rs. 29.4 lakhs, even when the generation of power is only 40 per cent of the installed capacity. The daily loss can be colossal if the costing is done on a more-realistic basis, taking into account the total investment, annual operational costs and capital expenditure and the total installed capacity.

Both the units of the RAPS had been on outage for 255 times in the last ten years which means that once in every 14 days there was a shut down. The second unit, within its nine months of existence, had been shut down for 22 times. Over 1,200 engineering changes have been effected in the plant till the end of last year. RAPS-I, have logged about 1,300 effective full power days of operation, shows that for almost every day of full power operation there was a design change.

Even accepting the statistics provided by the DAE on face value, a plant with an initial investment of over Rs. 175 crores and an annual operational and capital expenditure of Rs. 46 crores (for 1981-82), operating at 40 per cent capacity factor, that too only for 60 per cent of the available time, cannot be economically viable, it is pointed out.

The DAE, in its 1982-83 performance budget, describes the economics of nuclear power as follows: "At current prices, a nuclear power station of about 470 MW capacity, located beyond 1,000 km of the pithead of coal mines and operating at 75 per cent capacity factor is economically competitive with a thermal power station of comparable capacity and operating at 60 per cent capacity factor, if located at the same site".

It follows that the RAPS, never having operated at 75 per cent capacity factor, is not economically competitive with a thermal power station, if at all one chooses to defend nuclear power vis-a-vis thermal power.

The costing of power produced at RAPS seems to vary. While the performance budget of the DAE claims that the unit price of power worked out at 20 paise, a senior engineer of the Power Project Engineering Division of the DAE, in a paper specifies the unit energy cost at RAPS for 1981-82 as 27.8 paise. No doubt, nuclear energy can be made as cheap as that it can be supplied to consumers even without metering their consumption, but this would make any sense only when the energy is produced on a sustained basis.

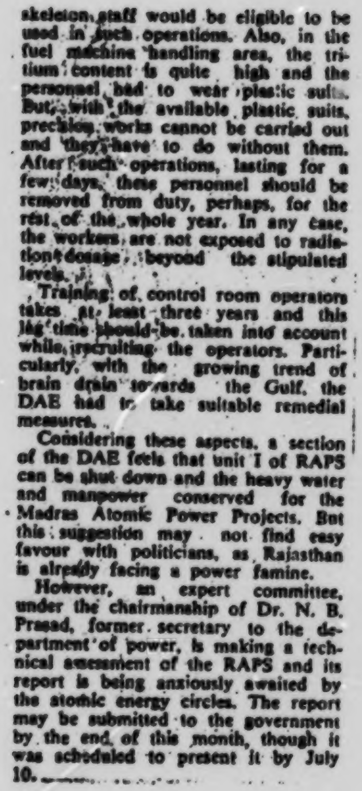
The latest problem with unit I has been that of leaks in end shield, First noticed in September last, the authorities hope to repair the unit by September next. Special procedures to repair the leak are being developed with necessary tooling and the experts consider this to be one of the most challenging tasks ever faced by the nuclear engineers here. After all the necessary repairs, it is believed that the unit's capacity may be further reduced. Sources attribute the problems to the Canadians who left the project mid-way after India exploded a bomb in 1974.

Apart from the inherent design defects, which led to the abnormally high leakage rate of the precious heavy water, every time the vaults were opened, there was also spillage.

The heavy water had to be stored separately in seven different categories, depending on their grade of purity. This operation called for a dedicated, highly skilled personnel.

HIGH RADIATION

Because of higher radiation ranges in the plant, the availability of plant personnel quickly dwindled. For example, fuelling machine head develops some "hot spot" with high dose of radioactivity and it is not possible to clean it during every fuelling operation. Thus, the workers had to be exposed to the statutory level and towards the end of the year, only



skeleton staff would be eligible to be used in such operations. Also, in the fuel machine handling area, the tritium content is quite high and the personnel had to wear plastic suits. But, with the available plastic suits, precision works cannot be carried out and they have to do without them. After such operations, lasting for a few days, these personnel should be removed from duty, perhaps, for the rest of the whole year. In any case, the workers are not exposed to radiation dosage beyond the stipulated levels.

Training of control room operators takes at least three years and this lag time should be taken into account while recruiting the operators. Particularly, with the growing trend of brain drain towards the Gulf, the DAE had to take suitable remedial measures.

Considering these aspects, a section of the DAE feels that unit I of RAPS can be shut down and the heavy water and manpower conserved for the Madras Atomic Power Projects. But this suggestion may not find easy favour with politicians, as Rajasthan is already facing a power famine.

However, an expert committee, under the chairmanship of Dr. N. B. Prasad, former secretary to the department of power, is making a technical assessment of the RAPS and its report is being anxiously awaited by the atomic energy circles. The report may be submitted to the government by the end of this month, though it was scheduled to present it by July 10.

CSO: 5100/7124

RAJYA SABHA DISCUSSES NUCLEAR POWER STATION PROBLEMS

Bombay THE TIMES OF INDIA in English 16 Jul 82 p 15

[Report on 15 July Rajya Sabha Session]

[Excerpt] NEW DELHI, Jul 15 (UNI & PTI)--THE Prime Minister, Mrs. Indira Gandhi, told the Rajya Sabha that the existing stock of fuel in the Tarapur atomic power station was likely to last till 1984.

The Tarapur unit was now being operated at lower levels to stretch the available fuel, she said in a written answer.

Replying to another question, Mrs. Gandhi said the enriched uranium sections of the nuclear fuel complex at Hyderabad were likely to be closed down in the event of non-receipt of further supplies of enriched uranium. The government would, however, ensure continued operation of the Tarapur atomic power station, she added.

Answering another question, Mrs. Gandhi said there had been an inordinate delay in the supply of enriched uranium from the U.S. since 1975. The U.S. government had indicated their inability to supply any further fuel.

Mrs. Gandhi said a decision to reprocess the spent fuel would be taken by India at the appropriate time. All nuclear power stations in the country, except Tarapur, use natural uranium as fuel, for which sufficient indigenous capacity was available.

Total installed nuclear power generation capacity in the country is 860 MW. Six more power reactors, each of 235 MW capacity, were under construction. In addition, provision has been made for commencing work on four more reactors during the sixth plan period.

Heavy water: The cumulative demand for heavy water to meet the requirement of the country's nuclear power programme is about 426 tonnes in March 1983. This is expected to rise to 1550 tonnes by March 1988.

Mr. C. P. N. Singh, minister of state for science and technology, said that the actual production of heavy water by the three operating plants at Nangal, Baroda and Tuticorin was about 51 tonnes in 1981.

The heavy water plants at Kota and Talcher were expected to be commissioned later this year. The delay in completion of these two projects was of three to four years.

He said the target for production of heavy water from the three operating plants in the current year was 80 tonnes. Fifty tonnes of heavy water was expected to be imported from the U.S.S.R. during 1982-83, he added.

Replying to another question, the minister said the Madras atomic power project at Kalpakkam had been completed. But it would be commissioned only after adequate inventory of heavy water had been built up.

He said the requirement of heavy water for initial charge of the reactor at Madras atomic power plant was 240 tonnes and the "make up requirements is in the region of 10 to 15 tonnes." India had the capability to produce heavy water by more than one established process, he added.

Replying to another question Mr. Singh said the government proposed to set up a 200-tonnes capacity heavy water plant at Manguru in Andhra Pradesh. Work on the project was expected to start later this year.

CSO: 5100/7122

BRIEFS

HEAVY WATER DELAY--Science and Technology Minister CPN Singh told the Rajya Sabha that the delay in the completion of the heavy water projects, Kota and Talcher, ranged from three to four years. This was attributable to the developmental efforts involved in the technology, delay in supply of equipment by indigenous and foreign suppliers, poor response to civil engineering contract action due to remoteness, etc. Heavy Water: In reply to another question Mr Singh said 19980 tonne of heavy water valued at Rs 523.85 crore was imported till date this year. [Text] [New Delhi PATRIOT in English 22 Jul 82 p 4]

KALPAKKAM NUCLEAR PLANT--NEW DELHI, Jul 15--The construction of the first unit of the Madras atomic power project at Kalpakkam has been completed and it will be commissioned as soon as adequate inventory of heavy water is built up, Mr. C. P. N. Singh, Minister of State for Science and Technology, informed the Rajya Sabha today. He said the requirement of heavy water for initial charge of the reactor in Kalpakkam was 240 tonnes and the "make up requirement is in the region of 10 to 15 tonnes." India had the capability to produce heavy water by more than one established process, he added. Replying to another question Mr. Singh said that a 200-tonne-a-year heavy water plant at Manguru in Andhra Pradesh, would come up by the end of 1982. [Text] [Madras THE HINDU in English 16 Jul 82 p 6]

CSO: 5100/7123

'ISLAMIC BOMB' PROPAGANDA REFUTED

Islamabad THE MUSLIM in English 25 Jul 82 p 5

[Book Review: "The Islamic Bomb"]

[Text]

THE ISLAMIC BOMB: by Steve Wwissman and Herbert Kroeney, Times Books, New York, 1981.

By: M. Qureshi
CHEM. ENG.
PAINESVILLE, Chio NSA

Both the authors are T.V. and newspaper journalists and are Zionists Jews. They do not try to hide their relationship with the state of Israel and openly show their strong bias against the Arabs and the rest of the world.

The main stress of the book, which is ubiquitous, is on the point that if an Arab or any third world country, other than the state of Israel, wants to acquire nuclear technology, it is exclusively because of their desire to make a nuclear bomb. Therefore, the technologically advanced nations in the West should not supply to these countries materials which can be used for or in anyway aid in the making of such a bomb. According to the authors, Pakistan should not be sold items like vacuum valves, pipe and metal cutting tools, electric wires, etc., because such items can be used in the creation of nuclear bombs.

The book comprises of 339 pages, is divided into six main sections and altogether has seventeen chapters. Of these, three chapters are devoted to the bombing of the Iraqi nuclear plant by the Israelis. Section four is devoted to Pakistan, which has three chapters and a total of 62 pages. The rest of the book is interspersed with the history of nuclear development, the Arab-Israeli conflict, Pakistan-Arabs relations and so forth.

The bookappears to be primarily aimed at those Jews who, inspite of having been told many proben lies in the past by the Zionists still remain their easy prey. To this type of reader the remarkable achievements of the Pakistani team of scientists will not easily become apparant. The book does try to achieve this task but does not quite succeed.

One of the authors, Steve Weissman, worked as an investigative reporter for a 1980 TV programme for the BBC bearing the same title as the book, "The Islamic Bomb." Most of the material for the book comes from this source and contributes to the general quality of the book. After a little reading, the book takes on the appearance of acollection of a series of new dispatches, all leading to an inconclusive end: whether the Pakistanis actually have the Islamic Bomb or not.

To a Zionist Jew in the West or in Israel, the existance of the state of Israel was justifiable only through the barrel of a gun and its economic and technological ingenuity. When the latter two dissolved into a quagmire, only the first item was left to pin all their hopes upon. Planting of this hope in the now well known Israeli fifth column in the West will become the main aim of the Zionists. This will however, prove futile and may eventually backfire. This fifth column in the West helps Israel with money, but, above all, it helps her with propaganda. In the face of the imagined fear of the development of the Islamic Bomb, only the propaganda in the West will be the mainstay for the existence of the state of Israel in its present Zionists form. There is no doubt that the immediate task facing Pakistan and her friends would be to counteract and undermine the unreal Israeli propaganda in the west. This is the most urgent need on this issue.

The authors try to impress upon the reader that they have succeeded in obtaining the information which may still be classified in Pakistan. However this impression does not last long, when they repeatedly attribute most of their information to people whom they never identify other than calling them only as "reliable sources.' The book looses its value even further when it fails to state clearly, whether the Pakistanis had succeeded in making hundreds of bombs or none.

The reader will be puzzled by the hesitancy of the authors in not explicitly identifying Pakistan as a fullfledged nuclear nation. He will recall that the authors in more than one place state that besides the existence of a small experimental nuclear reactor and a small experimental reprocessing facility for many years, Pakistani scientists completed a pilot reprocessing plant in the midseventies capable of producing ten to fifteen kilograms of material enough to make 2 to 3Hiroshimatype atomic bombs each year. It is further alleged that another pilot plant, this one for the enrichment of urananium, was completed in the later part of the seventies, capable of producing every year six or seven nuclear bombs. Another reprocessing plant, this one on the industrial level was, according to the authors, near completion with an annual reprocessing capacity of 100 tons of used reactor fuel. And yet another industrial plant, this one using the most advanced technology for the enrichment of uranium, was complete and had a trial run in 1979.

People who know the Zionists and their propaganda tactics, know that the confusion spread in the book is not coincidental but ~~deli-~~ deliberate. The book, instead of being informative, which a book of this kind should be, turns out to be a munbo jumbo of Talmudic lies. The Talmud is claimed by the staunch Zionists as a holy book, which exhorts that to cheat and to lie to Christians and other non-Jewish people of the world is a great virtue of the Jewish life.

Pakistani nuclear scientists do not get their due credit. So does the Pakistani team which did all the procuring of material in the West. In fact the authors drop a hint of sidicule here and there. The whole book, deliberately adopts a wishy-washy approach. For instance, they would ask representatives of compaines, which were supposedly supplying materials to Pakistanis, whether they know what the Pakistanis were upto, and wather they will stop supplying the Pakistanis in the future?. The answers the authors get in most cases are invariably the same, viz. that these companies will continue supplying the Pakistanis in the future as they have been doing in the past. In the light of the European Community trading principles, such as just mentioned, the authors threaten at one point in the book that "selling equipment to help Pakistan build a nuclear arsenal will henceforth be considered something akin to trading with the enemy in time of war". (p.221) This has the ring of an infantile babbling. In Europe and America, it is increasingly becoming apparent to the average conscious citizen that Zionism and Israel are, indeed, their real enemies who, besides inflicting visible harm to their nations, also seem to be secretly working in full co-operation with the USSR.

President Zia in the book is called a "shrewed and tough politician," who withstood strong American pressure to stop the Pakistani nuclear programe. President Zia is also said to have kept the French from completely buckling under the US pressure and who continues to get almost everything from the French to complete the contracted reprocessing plant. The book surmises that if it had been anybody other than Pr. Zia, the Pakistani nuclear programe probably would have become forgotton history.

Elsewhere, the book alleges that Pr. Zia does not tell the truth when he insirts that Pakistani nuclear programe is for peaceful purposes. It says that some Western diplomats are also skeptical about Pr. Zia's Hatrments. This conclusion is, however, fully reputed by the fact that unless Pakistan wished to literally swim in a sea of nuclear bombs, she would have absolutely no need for its two very expensive and huge industrial nuclear plants. These plants can only be for industrial purposes. For with these plants in production, Pakistan will be able to regenerate reactor fuel as well as separate rare precious metals. These materials will help Pakistan earn the much needed foreign exchange. With the natural resources of uranium soon to become depleted, Pakistani plants will turn into even more valuable assets. Also, by developing its nuclear programme from domestic technical resources, Pakistan may be able to establish a base which could usher her among the world's moderate industrial nations.

It is obvious that the book might not have come into existence were it not to express Israel, military propaganda strategy of bluff in the face of progressive loss of supermacy in the region. It came out only shortly after the formidable military buildup of her neighbours and their political victories on the world scene. In this regard the book also cites a report put forth by the Tel Aviv University Center for Strategic Studies. This report (p.307 footnote) strangely enough, came out on Aug. 25, 1981 the time when the book must have been just ready to go to the printing press.

The report suggests that in the light of the inevitability the Arabs acquiring nuclear weapons, Israel should develop a second strike capability in case the Arabs make the first strike. No matter how sincere these planners may be in their assessment, one consideration must, obviously, haunt their minds constantly: for its size and population Israel cannot even afford to whisper about the nuclear strategh much less to talk about it in the open.

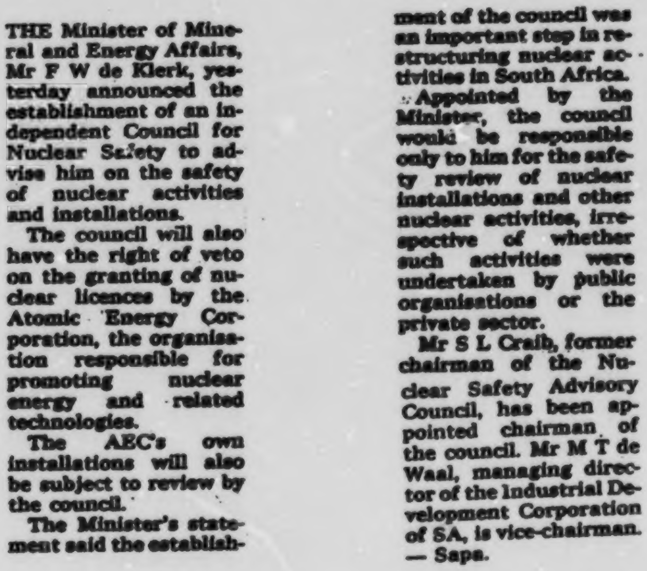
Finally, in what the book has to say about the much expected Pakistani nuclear test, which so far has not taken place, it is in full agreement with what most experts have been saying all along. For the Pakistanis the desire to explode a nuclear device will be dictated by political necessities and not by technological considerations.

CSO: 5100/5690

NUCLEAR SAFETY COUNCIL SET UP

Johannesburg THE CITIZEN in English 30 Jul 82 p 8

[Text]



THE Minister of Mineral and Energy Affairs, Mr F W de Klerk, yesterday announced the establishment of an independent Council for Nuclear Safety to advise him on the safety of nuclear activities and installations.

The council will also have the right of veto on the granting of nuclear licences by the Atomic Energy Corporation, the organisation responsible for promoting nuclear energy and related technologies.

The AEC's own installations will also be subject to review by the council.

The Minister's statement said the establishment of the council was an important step in restructuring nuclear activities in South Africa.

Appointed by the Minister, the council would be responsible only to him for the safety review of nuclear installations and other nuclear activities, irrespective of whether such activities were undertaken by public organisations or the private sector.

Mr S L Craib, former chairman of the Nuclear Safety Advisory Council, has been appointed chairman of the council. Mr M T de Waal, managing director of the Industrial Development Corporation of SA, is vice-chairman. — Sapa.

CSO: 5100/5689

BRIEFS

NO KOEBERG DANGER--CAPE TOWN--The switchboard fire at the Koeberg nuclear power station last weekend posed no threat to nuclear safety, a spokesman at the plant said yesterday. Investigation into the cause of the fire was continuing. Preliminary findings indicated "a foreign body accidentally may have been left inside the distribution board and caused the fault which in turn led to the fire". The plant was still in the testing phase and some electrical protection arrangements were left incomplete. "This situation may have led to the delay in clearing the fault," the spokesman said. [Text] [Johannesburg THE CITIZEN in English 24 Jul 82 p 2]

CSO: 5100/5688

QUEBEC TO TRAIN OWN NUCLEAR ENGINEERING SPECIALISTS

Montreal LA PRESSE in French 25 Jun 82 p A11

[Article by Jean Poulain]

[Text] By means of an agreement reached between the EACL [Atomic Energy of Canada, Ltd] and the Polytechnical School of Montreal, which was signed officially yesterday, Quebec, or Hydro-Quebec to be specific, after a 20-year lag behind Ontario, is going to be able to develop its expertise in nuclear engineering, and will be able to train its own specialists.

The agreement covers the transfer of technology, including magnetic tapes and software (computer programs), covering 20 years of experience exchanged between this federal crown company and Hydro-Ontario in the field of nuclear power plants.

As the president and principal of the Polytechnical School, Mr J. Bernard Lavigueur, explained to LA PRESSE before the official signing of this agreement, the selection of this Quebec engineering school was prompted by its IGN [Nuclear Engineering Institute], which has been training theoreticians in this field for the province since its founding in 1970.

This new cooperative program with AECL will be carried out through the GAN [Nuclear Analysis Group], an organization that was set up in June 1981 with the financial and technical assistance of Hydro-Quebec.

Mr Wladimir Paskievici, the director and head professor at the IGN, told LA PRESSE that the agreement with the EACL will enable the Quebec school to study the AECL's software for nuclear power plant simulation. This simulation is used in Ontario, but not in Quebec.

The original idea behind this agreement for Quebec was to train a minimum number of nuclear engineering specialists in case the province should decide to build its own nuclear power plants.

Before the document was signed, Mr Laurent Amyot of EACL made a short speech, in which he mentioned the three major features of this agreement:

a. It is the first formal agreement under the sponsorship of the Quebec office of the EACL; this office was established last January.

b. The EACL will cooperate with the Polytechnical School through the school's IGN, for the application of the computer programs transferred.

c. A subsidy of $120,000 a year will be provided by the federal crown company.

The agreement also includes the official cooperation of the GAN, which is receiving from EACL the license enabling it to use EACL's software. According to Mr Amyot, this is setting a precedent in Canada, and perhaps even in North America.

Mr Lavigueur, president of the Polytechnical School, said that the reasons behind the founding of the IGN in 1970 were first to train specialists in nuclear engineering, and secondly, to conduct research in this field.

The administration of the Polytechnical School then proposed to Quebec's ministry of energy that nuclear technology be transferred from Ontario to Quebec, with the establishment in June 1981 of the GAN, with Hydro-Quebec as its main user.

An EACL staff member, Paul-Edmond Tremblay, indicated that the agreement calls for the transfer within 60 days of about a dozen codes (computer programs) to the Polytechnical School, in the form of magnetic tapes and other documents.

The agreement also calls for providing assistance to students in interpreting the programs being transferred.

Finally, the EACL will pay an annual subsidy of $120,000.

In all, said the EACL staffer, "we plan to transfer about 40 codes within the next 3 or 4 years."

Mr Daniel Rozon, the deputy director of the GAN, who is in charge of programming, said that it was essential for Hydro-Quebec to acquire some knowledge in the field of nuclear engineering. This knowhow, he said, is not just information contained in libraries, but it also means the acquisition of an art, of experience that might have been very expensive to obtain, in terms of the design of a power plant or a reactor. Not only can this knowledge now being obtained at a better cost, but also factors concerning the safety aspects of the operation, through the use of digital computer simulations (equations concerning the neutron flow, thermo-hydraulics, analysis of constraints, the propagation of radioactivity, etc.)can be acquired.

7679
CSO: 5100/2211

BRIEFS

PWR FACILITY AT CIVAUX--On Wednesday afternoon in Poitiers, Mr Edmond Herve, the minister of energy, announced that the government has decided to build a PWR [Pressurized Water Reactor] plant at Civaux (Vienne department). This plant will, however, have only two of the four 1300 MW units originally planned for the project. Mr Herve made this statement while speaking to the elected officials of the department and the members of the local information commission. "The commission had expressed some reservations about the problems with water," said the minister, if four units were built. So we followed its opinion, and decided to build only two units." The public investigation will begin in either September or October of this year, and the statement of public utility might be made by 1 July 1983. Work should start in 1985 and the power plant could be operating in 1991. With two units, the construction site should employ up to 2,200 people, and a procedure called "post-major construction projects" will be used for the benefit of the region. [Text] [Paris LES ECHOS in French 2 Jul 82 p 6] 7679

LOIRE REGION FAVORS INSTALLATION--On Monday, meeting at Nantes, the general council of the Loire region came out in favor of the Carnet site for the construction of a nuclear power plant in the Basse-Loire area. The minister of energy had asked the regional officials to choose between the sites of Rohars (on the north bank of the Loire) and Le Carnet (on the south bank), after giving them the studies done by EDF [French Electric Power Company]. This topic aroused a heated debate between the majority of the council which belongs to the opposition, and the PS [Socialist Party] which abstained from voting. The PC [Communist Party] spoke out in favor of the site at Le Carnet. [Text] [Paris LES ECHOS in French 6 Jul 82 p 4] 7679

NUCLEAR TALKS WITH TAIWAN--Negotiations on the storage and reprocessing of irradiated fuels and wastes from Taiwan's nuclear power plants are now in progress between French authorities and the Taiwan Power Company, which operates these plants, said the chairman of the company, Mr Chen Lan-Kao. Mr Chen, in speaking to the Taipei Parliament, said that agreements on this matter should be signed by Taiwan with several foreign governments, including the French government, within the next few years. Until the present, the problem of the storage and reprocessing of nuclear wastes from the three power plants (built in the United States) operating in Taiwan has been covered by agreements with the United States. Mr Chen did not say why the French had been contacted on this matter. [Text] [Paris LES ECHOS in French 23 Jun 82 p 7] 7679

LA HAGUE REPROCESSING PLANT OUTPUT--The output of the La Hague reprocessing plant has been "very definitely higher" than last year's," announced the plant's management. During the reprocessing program for fuels from light water nuclear power plants, which ended on 30 June, 165 tons were reprocessed. This figure was 140 tons in 1979-1980. This raises to 510 tons the total of this type of fuel which has been reprocessed at La Hague, said the management sources. This program, which had scheduled the reprocessing of 135 tons during the first half of 1982, was exceeded with 154 tons. According to the management, this most recent program confirms the plant's ability to handle a minimum capacity of 250 tons a year. The expansion now in progress will raise this capacity to 1,600 tons a year at the end of this decade. As happens every year, the reprocessing operations will be halted during July and August. These two "inter-program" months will be used for maintenance and for "modifications and additions." [Text] [Paris LES ECHOS in French 6 Jul 82 p 4] 7679

STRIKE ENDS AT NOGENT--After a 60-day strike, work resumed on Tuesday at the site of the future Nogent-sur-Seine nuclear power plant. With a certain amount of lassitude, the last group of CGT [General Confederation of Labor] strikers (about 100 workers) brought an end to this conflict which had been at a standstill for over a month. The company's management gave the workers job guarantees, a 13th month of wages as a bonus, and a 2-point increase in the bonus for good performance. However, the CGT did not get a bonus for short-distance moves, indexing of wages on the Ile-de-France region, and an increase of up to 10 percent in the bonus for good job performance. Because of this dispute, the GIE [Economic Interest Group] is losing 10 million francs; it will now have to renegotiate a new schedule for completion of the job with EDF [French Electric Power Company]. [Text] [Paris LES ECHOS in French 24 Jun 82 p 7] 7679

CSO: 5100/2216 END

JPRS 81607

23 August 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 159

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JPRS 81607

23 August 1982

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 159

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INDONESIA, CANADA SIGN NUCLEAR COOPERATION ACCORD

BK141003 Jakarata ANTARA in English 9035 GMT 14 Jul 82

[Text] Jakarta, July 14 (ANTARA) -- Indonesia and Canada have signed a cooperation agreement in the application of nuclear power for peaceful purposes. The Indonesian minister of mines and energy, Subroto, and the Canadian foreign minister, Mark MacGuigan, signed the cooperation agreement in Ottawa, Canada, Monday. Minister Suboroto is in Canada for a five-day visit to that country. In the first day of his current visit, Subroto met his Canadian counterpart, Marc Lalonde, to discuss the present development of energy trade in the world and bilateral cooperation in the development of coal and nuclear energy. Subroto also had the opportunity to hold talks with Canadian Trade Minister Ed Lumley on the participation of Canadian companies in infrastructural projects in Indonesia.

While in Canada, Subroto will visit Quebec, Toronto, Edmonton, Victoria and Vancouver, and will also meet several Canadian key officials dealing with the energy field, to discuss the development of oil, coal and hydropower energy in west Canada.

According to the spokesman of the Canadian Foreign Office, the newly signed agreement will pave the way for the supply of Canadian uranium and the transfer of Canadian nuclear technology to Indonesia.

CSO: 5100/2231

NUCLEAR-SHIP BAN CONTROVERSY RAGES; HAYDEN RETREATS

Victorian ALP Stand

Canberra THE AUSTRALIAN in English 21 Jun 82 p 2

[Article by Tim Pankhurst]

[Text] THE Victorian Labor Conference at the weekend adopted a hard anti-nuclear stance before the crucial national policy conference in Canberra next month.

Almost 500 delegates unanimously supported the Victorian Government's opposition to visits by nuclear-powered or armed vessels and the nuclear industry in general.

But the State secretary, Mr Bob Hogg, admitted: "Clearly, in hindsight, we could have handled it better."

He said more effective constant co-operation was needed between the State and federal parties.

This was a recognition that the Prime Minister, Mr Fraser, has exploited indecision within the ALP on a common nuclear policy and that the Victorian Government made mistakes in forcing the issue.

The Premier, Mr Cain, was forced to bow to Commonwealth powers last week and withdraw a directive to port authorities that they deny facilities to visiting nuclear waships.

A motion on the establishment of a nuclear-free zone by the Government had to be amended to add "within the limits of its own powers" as recognition of federal defence and foreign affairs reponsibilities under the Constitution.

Mr Cain seconded the amendment and reaffirmed his Government's commitment to a nuclear-free Victoria.

He said proposed legislation to ban nuclear industry and uranium mining within the State would be the cornerstone of the Victorian policy.

Foreign nuclear warships were not welcome but if the Federal Government legislated to allow their entry then it must accept full responsibility for the safety of Victorians.

Mr Hogg said the State had not tried to adopt a unilateral position on defence and foreign affairs.

The Government was talking about the safety of the community, particularly around Port Phillip Bay.

The policy was put up in good faith and was not part of a conspiracy theory or paybacks as a "paranoid press" had suggested, he said.

He said Japan had such a policy and nobody was suggesting that that was a threat to the Western alliance.

Australia, with the exception of Queensland, was not a banana republic and did not need visits by foreign navies to reassure it.

A left-wing MLC, Mrs Joan Coxsedge, said the Victorian Government was part of the largest mass movement the world had ever seen and must be in the vanguard of the anti-nuclear movement.

She said the American navy was not welcome and if it had enough sense it would stay away.

The State and federal Labor policies on uranium both call for a moratorium on its mining and treatment.

Secret Sydney Ban

Brisbane THE COURIER-MAIL in English 22 Jun 82 p 8

[Text] CANBERRA. — A secret Federal Government report has ruled out Sydney Harbor as being suitable for visits by nuclear warships.

The 1970 report said this was because the naval berths and dockyards were surrounded by dense population.

In ruling out Sydney Harbor for short or long-term visits by nuclear-powered warships, the report said there was no suitable area to provide a berth or anchorage for use in an emergency.

"The port is of such commercial importance that it would have serious consequences for the economy if incapacitated by a nuclear accident," the report said.

There have been no visits to Sydney by nuclear-powered warships since the Labor Government was elected in 1976.

The report to the Federal Government said the minimum requirements for providing facilities for nuclear ships were a one-and-a-half mile direct control area around the ship.

Union Action

Melbourne THE AGE in English 22 Jun 82 p 5

[Article by Kate Legge]

[Text] Victorian maritime and stevedoring unions will ban nuclear-fuelled vessels and ships carrying nuclear weapons from the Port of Melbourne.

Union officials said yesterday that the withdrawal of Australian waterside labor would not stop naval ships, but bans on port facilities and tugs could obstruct the passage of nuclear powered commercial vessels.

They see the threat of industrial action as an important contribution to increasing public support for the Victorian Government's anti-nuclear stand.

The Victorian branch of the announced that it would call a stopwork meeting the minute a nuclear ship entered Port Phillip Bay.

The union's secretary, Mr Geoff Waterside Workers' Federation Swayn said: "We are not subject to the same constitutional restrictions as the State Government, and our members can take a wide range of action".

Mr Swayn said the union's action would interfere with commerce and trade, and force the business world to lobby the Federal Government on the nuclear ships issue. He said maritime unions would recommend that all unions affiliated to the Trades Hall Council consider extending the bans.

"We congratulate John Cain for taking such a strong stand and we condemn the Port of Melbourne for its indecent tactics in this debate," Mr Swayn said. "The authorities endeavored to side with Mr Fraser, but they have not come out of it with any honor."

He said the union was concerned about the risk of accidents in an already-crowded port. "We care about the safety of workers and Victorians in general, and strongly object to nuclear arms," he said.

The Seamen's Union also strengthened its opposition to nuclear ships in protest against the Federal Government's stand. The union's assistant secretary, Mr Roger Wilson, said: "We welcome the statements made by the Victorian Government, and our members will refuse to assist the passage of any nuclear ships."

In another political move, the Victorian branch of the WWF yesterday voted to ban work on Israeli ships for 21 days in protest against the recent invasion of Lebanon.

Hayden Switch

Brisbane THE COURIER-MAIL in English 23 Jun 82 p 1

[Article by Wallace Brown]

[Excerpts] **CANBERRA. — A key meeting of top federal Labor MPs late yesterday made the Federal Opposition Leader, Mr Hayden, reverse his stand in effect against visits to Australia by nuclear-armed United States' ships.**

This came in the wake of an equally-important ANZUS council communique which stressed the need for such ships to have access to Australian ports.

The embarrassing backdown was forced on Mr Hayden in Sydney as his colleagues in the parliamentary party's foreign affairs committee sought to defuse the controversial nuclear warships issue — and to stop it from damaging Labor further.

They decided they could not afford to wait until the ALP national conference starting on July 5 clearly defined policy.

In a carefully-qualified statement, Mr Hayden said later: "I oppose the home-porting of foreign warships in Australia, the storage of nuclear weapons on Australian territory and the launching of operations involving nuclear weapons from Australian territory."

He added: "Nothing I have said here would prevent the use of our ports for maintenance, essential repairs or refits, regular rest and recreation for crews and ships of allies or treaty partners."

Mr Hayden did not refer specifically to nuclear-armed ships, but when a Hayden spokesman was asked if Mr Hayden was including them in that context, he replied: "Yes."

Mr Hayden, in his statement after the Sydney meeting, said: "The Labor Party is neither neutralist nor isolationist."

He said: "The ANZUS treaty is a key part of our foreign policy commitment and we will do nothing to undermine it.

"The constitutional pre-eminence of the national government's powers in defence and foreign policy matters is unquestionable.

"We do however believe that the states have a role and responsibility to set safety standards in consultation with the national government governing the movement and docking of vessels which are nuclear-powered.

"We support the continuation of present practice whereby comprehensive radiation monitoring of visiting warships is carried out by the Atomic Energy Commission in conjunction with state authorities."

"This means that nuclear-powered foreign naval vessels visiting Australian ports could use appropriate Australian defence and naval facilities as often as necessary subject to proper safety conditions."

Mr Hayden claimed nothing he had said involved opposition to the use of Australian bases and facilities by allies in war time or in periods of international tension involving a threat to Australia.

CSO: 5100/7543

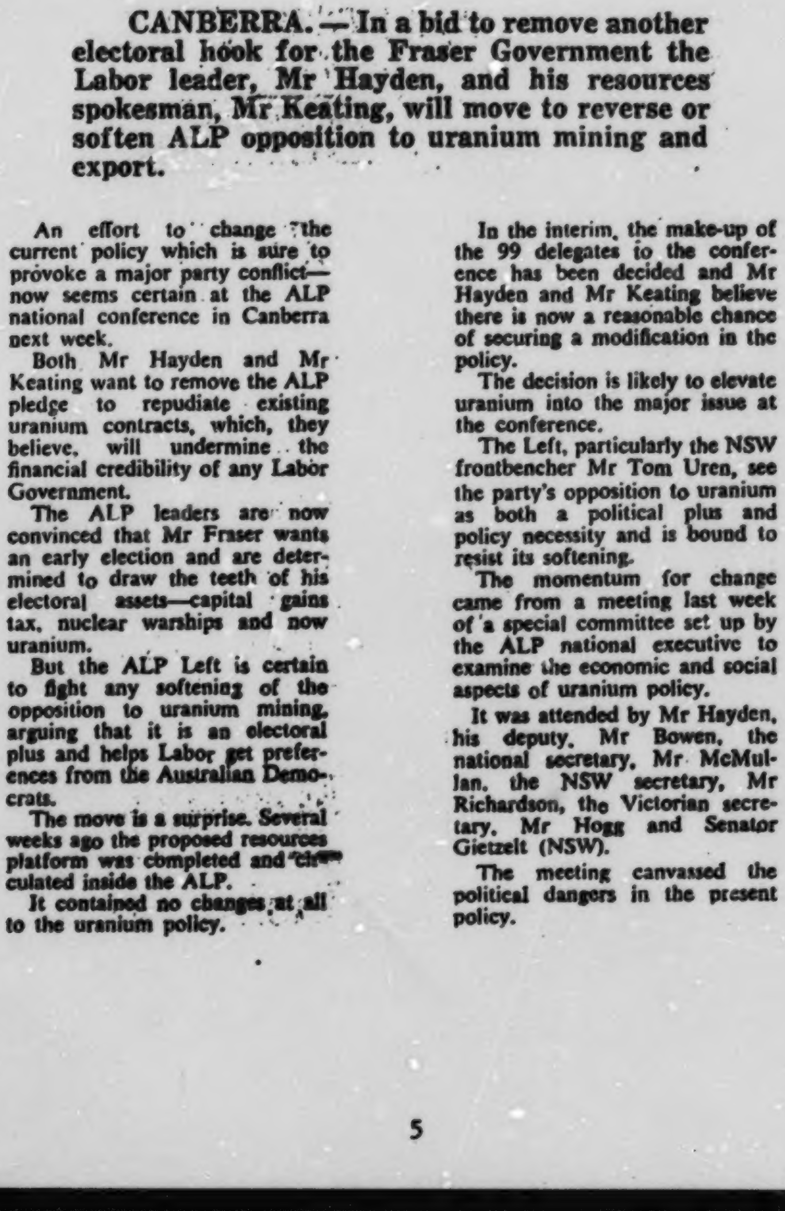
HAYDEN SOFTENS ANTI-NUCLEAR STAND BUT BACKS ARMS FREEZE

ALP Policy Maneuvering

Sydney THE SYDNEY MORNING HERALD in English 29 Jun 82 p 1

[Article by Paul Kelly]

[Text]



CANBERRA. — In a bid to remove another electoral hook for the Fraser Government the Labor leader, Mr Hayden, and his resources spokesman, Mr Keating, will move to reverse or soften ALP opposition to uranium mining and export.

An effort to change the current policy which is sure to provoke a major party conflict—now seems certain at the ALP national conference in Canberra next week.

Both Mr Hayden and Mr Keating want to remove the ALP pledge to repudiate existing uranium contracts, which, they believe, will undermine the financial credibility of any Labor Government.

The ALP leaders are now convinced that Mr Fraser wants an early election and are determined to draw the teeth of his electoral assets—capital gains tax, nuclear warships and now uranium.

But the ALP Left is certain to fight any softening of the opposition to uranium mining, arguing that it is an electoral plus and helps Labor get preferences from the Australian Democrats.

The move is a surprise. Several weeks ago the proposed resources platform was completed and circulated inside the ALP.

It contained no changes at all to the uranium policy.

In the interim, the make-up of the 99 delegates to the conference has been decided and Mr Hayden and Mr Keating believe there is now a reasonable chance of securing a modification in the policy.

The decision is likely to elevate uranium into the major issue at the conference.

The Left, particularly the NSW frontbencher Mr Tom Uren, see the party's opposition to uranium as both a political plus and policy necessity and is bound to resist its softening.

The momentum for change came from a meeting last week of a special committee set up by the ALP national executive to examine the economic and social aspects of uranium policy.

It was attended by Mr Hayden, his deputy, Mr Bowen, the national secretary, Mr McMullan, the NSW secretary, Mr Richardson, the Victorian secretary, Mr Hogg and Senator Gietzelt (NSW).

The meeting canvassed the political dangers in the present policy.

The national executive already has an opinion from the shadow Attorney-General, Senator Evans that the repudiation clause in ALP policy could be implemented without making the Government liable for huge compensation payments from the uranium companies.

But Mr Hayden and Mr Keating remain worried that repudiation of contracts will create grave difficulties for a Labor Government.

It will prejudice mines already operating and investments based on huge overseas loans financed by major international banks.

The main mine involved is Ranger, being developed by Energy Resources of Australia — which already has an estimated $1,000 million in long-term contracts.

Call for Weapons Freeze

Sydney THE SYDNEY MORNING HERALD in English 29 Jun 82 p 1

[Article by Jenni Hewett]

[Text] CANBERRA.—The Leader of the Opposition, Mr Hayden, has called on both superpowers to have a mutual freeze on nuclear weapons — and strongly criticised Australian Government policy on arms control.

Mr Hayden's support for a mutual freeze on nuclear weaponry is in clear contrast to the position taken by the Minister for Foreign Affairs, Mr Street, last week during a speech to the United Nations on disarmament.

Mr Street joined the US in opposing a mutual freeze as confirming existing nuclear and conventional superiority.

Mr Hayden also emphasised that despite the backdown last week on nuclear armed ships entering Australian ports, the ALP is committed to strong and wide ranging opposition to nuclear weapons and their proliferation.

Mr Hayden also moved to identify publicly with the position of his deputy, Mr Bowen, on measures to assure Australian sovereignty over the North-West Cape base.

In a speech to a trade union seminar on disarmament yesterday, Mr Hayden:

- Attacked the argument that the United States has a "window of vulnerability" in nuclear weaponry as "fictitious" and a "phony argument."
- Condemned the recent comments of the Prime Minister, Mr Fraser, on the dangers of the growing strength of the disarmament demonstrations as a "totally unjustified attack on the integrity of millions of deeply committed people."
- Accused the United States and the Soviet Union of acting in a totally schizophrenic way and said that any doctrines of limited nuclear war were specious.

Mr Hayden said that certain US facilities on Australian territory had been accepted as part of the ALP's commitment to the ANZUS Alliance.

But these were accepted only insofar as they were genuinely part of a stable system of nuclear deterrence.

CSO: 5100/7543

AUSTRALIA

AEC SUPPORTS NEW RADIOACTIVE WASTE DISPOSAL METHOD

Melbourne THE AGE in English 24 Jun 82 p 6

[Text] CANBERRA. — The Atomic Energy Commission has backed the viability of a radioactive waste disposal method developed by scientists at the Australian National University.

After almost three years of testing the disposal method, called SYNROC, the commission said it had significant advantages over disposal mediums favored by other countries.

The commission's backing for SYNROC is in an article in the latest edition of the Australian Foreign Affairs Record.

The method, which uses a synthetic rock, was developed by a team led by Professor Ted Ringwood, head of the Research School of Earth Sciences at the ANU.

Professor Ringwood and his team came under strong criticism in 1978 when their discovery was announced. The pro-nuclear lobby claimed the method was of no use because the problem had already been solved, while the anti-nuclear lobby claimed the problem could not be solved.

The commission's article said SYNROC held real promise in meeting society's requirements for the immobilisation and disposal of radioactive wastes in a safe way for very long periods.

"SYNROC is up to 500 times more effective than glass in retaining the wastes," the commission said.

"Already the commission has determined that SYNROC could maintain its integrity under irradiation for many thousands of years and that it could withstand continuous exposure to high temperature water without releasing significant quantities of the locked-in radioactive wastes."

The commission said it was now demonstrating that SYNROC could be economically manufactured on a large scale.

CSO: 5100/7543

U.S. REPORTED HOLDING UP SPARE PARTS FOR TARAPUR

Calcutta THE STAESMAN in English 24 Jul 82 pp 1, 7

[Text]

NEW DELHI, July 23.—It has been disclosed in Parliament that the USA had not only gone back on the 1963 agreement for the supply of nuclear fuel to the Tarapur Atomic Power Station, but that it had also boen holding up the export of a number of spare parts required for the station.

The Rajya Sabha was told that orders for a number of spare parts for the station were pending with the suppliers in the USA for want of export licences. "The U.S. Government is yet to clear these applications, in spite of repeated reminders', the Minister of State for Science and Technology, Mr C. P. N. Singh, told the House.

As for fuel, the House was told that as per the 1963 co-operation agreement between India and the USA the latter was bound to supply the fuel needed for the station, during the term of the agreement, until 1993.

"Necessary applications have been regularly made by India, and our applications for supplies due in 1980, and 1982 are still pending with the USA", the Government said in a written reply to a question.

It also stated that "the future of the agreement has been under discussion between the two Governments".

The Tarapur station uses slightly enriched uranium as fuel, while the other nuclear power stations in the country use natural uranium, for which sufficient indigenous capacity is available. There have been inordinate delays in the supply of enriched uranium from the USA since 1975, and indeed the U.S. Government has indicated its inability to supply any further fuel.

As a result, the station is being operated at a reduced power level, so as to stretch the capacity of the available fuel. The existing stock of fuel is likely to last until 1984.

The enriched uranium sections of the nuclear fuel complex at Hyderabad have, meanwhile, finished processing the last consignment of enriched uranium received from the USA and are currently processing and recycling the scrap generated during the normal operation.

The Rajya Sabha was told last week that "these sections are likely to close down by February 1983, in the event of non-receipt of further supplies of enriched uranium".

However, irrespective of further fuel supplies from the USA the Government of India will ensure the continued operation of the station, the Parliament was told more than once, during the current session.

CSO: 5100/7130

SPOKESMAN STATES RIGHT TO REPROCESS SPENT FUEL

BK010726 Delhi Domestic Service in English 0240 GMT 1 Aug 82

[Text] A government spokesman has said that India has the right to process spent fuel at Tarapur without any further consultations with the U.S. Government. There is no question of any joint determination in this regard. A member of the official delegation accompanying the prime minister on her U.S. tour explained that the original agreement provided for the transfer of the right to implement the safeguard provision to the International Atomic Energy Agency [IAEA]. After mutual consultations in 1971, India and the United States designated IAEA as the agency to administer the safeguard. India maintains that after this trilateral agreement, it can proceed with the reprocessing of the spent fuel. In other words, the joint determination which Washington is talking about has already been done. All that now remains is for India to notify IAEA so that they can start their monitoring operation.

All-India Radio special correspondent Manohar Chakru, covering the prime minister's visit to the United States, reports from New York that America has taken a different position on this issue. It says that despite the trilateral agreement it has still a say in the reprocessing. However, the disagreement will not come in the way of France supplying enriched uranium for the Tarapur plant. Our correspondent adds that there is no more storage capacity for stocking the spent fuel and this has lent urgency to reprocess it. India had notified the American Government in January last year that it will start reprocessing the fuel.

CSO: 5100/2231

BRIEFS

REACTOR OPERATIONAL IN 1983--India's first plutonium-based fast breeder test reactor at Kalpakkam, near Madras, is expected to commence operation next year. Minister of State for Science and Technology C.P.N. Singh told the Rajya Sabha that the reactor will have a normal thermal output of 42.5 megawatts and electrical power output of about 15 megawatts. The project cost is estimated at about 700 million rupees. [Text] [BK290957 Delhi Domestic Service in English 0830 GMT 29 Jul 82]

MADRAS HEAVY WATER SUPPLY--Adequate stock of heavy water is being built up indigenously to meet the initial requirement of the newly setup first unit of the Madras atomic power station. The initial requirement is 250 tons. The Lok Sabha was informed today that there will be no dependence on heavy water in the later stages. It was further stated that the proven resources of natural uranium are adequate for the current nuclear power program. [Text] [BK280843 Delhi Domestic Service in English 0730 GMT 28 Jul 82]

FUEL SUPPLY FOR TARAPUR--Prime Minister Mrs Indira Gandhi has said that the existing stock fuel in the Tarapur atomic power station is likely to last until 1984. Replying to a question in the Rajya Sabha today she said that the Tarapur station is now operating at lower levels to stretch the available fuel. The enriched uranium sections of the nuclear fuel complex at Hyderabad are likely to close down in the event of nonreceipt of further supplies. However, the government will insure continued operation of the Tarapur station, she added. [Text] [BK150811 Delhi Domestic Service in English 0730 GMT 15 Jul 82]

CSO: 5100/2231

BRIEFS

TOWARD NUCLEAR WEAPONS--The Australian Conservation Foundation--a privately-run organization--claims Indonesia has taken its first step towards the acquisition of nuclear weapons, materials and technology. The convener of the foundation's Energy Committee, Dr (Culter), said the Australian public should be alarmed by the signing of an agreement which opens the way for sale of Canadian reactors and nuclear technology to Indonesia. Dr (Culter) says Canadian reactors produce far more plutonium than the more common American light-water reactors and that plutonium from Canadian reactors can be diverted to bomb manufacture without being detected by international inspectors. [Text] [BK191340 Melbourne Overseas Service in English 0830 GMT 19 Jul 82]

CSO: 5100/2231

CEMA SESSION ADDRESSES ROBOTS, NUCLEAR POWER

PM151453 Moscow EKONOMICHESKAYA GAZETA in Russian No 26, Jun 82 signed to press 31 Jun 82 p 20

[Article by O. Rybakov and B. Vyazovov: "Important Event in the Fraternal Countries' Lives"]

[Text] The 36th CEMA session, which adopted a number of major decisions aimed at further intensifying socialist economic integration, was an important event in the life of the fraternal socialist countries.

Having examined the Soviet delegation's report on the results of the 36th CEMA session, the CPSU Central Committee Politburo and the USSR Council of Ministers noted that the session reaffirmed the fraternal countries' unanimous aspiration to strengthen the socialist community's cohesion and develop all-around mutually advantageous cooperation in all spheres of the economy, science and technology in the interests of enhancing the effectiveness of their national economies and improving the working people's well-being.

Life convincingly confirms again and again that now, as L.I. Brezhnev stressed in his report at the 26th CPSU Congress, it is impossible to imagine the confident development of a particular socialist country and its successful solution of problems such as the provision of energy resources and raw material and the introduction of sophisticated achievements of science and technology without ties with the other fraternal countries.

Following the Course of Scientific and Technical Progress

The successful solution of the tasks of intensifying the national economy and improving its efficiency set by recent congresses of the socialist community countries' communist and workers parties is closely linked with the need to accelerate scientific and technical progress. The program for the coordination of the CEMA countries' national economic plans for 1986-1990 adopted by the session attaches special significance to the fuller use of the potential of the international socialist division of labor with a view to accelerating scientific and technical progress and securing the balanced development of their national economies. It is pointed out that the coordination of plans will be supplemented by the coordination of economic and scientific and technical policy by interested CEMA countries.

An important practical contribution to the solution of these tasks is to be found in the general agreements signed at the session on cooperation in the development and extensive use of microprocessor technology in the national economy and the elaboration and organization of specialized and shared production of industrial robots. Under these agreements, cooperation and joint operations are envisaged in the sphere of research, planning and design development and, most important, the subsequent broad development of specialization and sharing in the production of automated complexes for manufacturing machinery, instruments and control systems equipped with sophisticated electronic devices.

A multilateral intergovernment agreement was also signed on questions of specializing and sharing in the production of articles for the microelectronic component base for computer hardware and material and technological equipment for microelectronics.

Speaking at the 36th CEMA session, Soviet delegation head N.A. Tikhonov, member of the CPSU Central Committee Politburo and chairman of the USSR Council of Ministers, noted the paramount importance in present-day conditions of concentrating forces in the main avenues of scientific and technical progress and doing the scientific and technical groundwork for the production of energy-, materials- and labor-saving machinery and means of automation and mechanization on the basis of the latest achievements in electronics. Cooperation in these sectors of leading technology, which are basically revolutionizing all social production and which ensure a sharp increase in the productivity of social labor, is becoming not only an economic task, but a major political task.

Prospects for Introducing Robots

The CEMA countries now attach great significance to micro-electronics technology. Microprocessor devices are described as the catalysts of scientific and technical progress. They work particularly successfully in so-called built-in automatic control systems -- machine tools with digital program control and manipulators (robots) used in various sectors of production.

As calculations by Soviet and foreign specialists show, in individual operations one robot replaces one to three workers, increases labor productivity by 20-40 percent, pays for itself in 1-3 years and results in an annual saving of R4,000-R9,000. The group use of robots increases labor productivity 100-200 percent, while the introduction of one robot yields, in all, a saving of R8,000-R12,000 per year. But it is not only a question of figures. The use of robots opens up fundamentally new possibilities in production -- it increases intensiveness and smooth running, improves the quality of output and reduces shoddy work.

Robots make it possible to develop fundamentally new technologies, replacing man in the production process. These technologies do not rely on a person's limited physical potential regarding speech, accuracy, load capacity and so forth. It is also important that robots can work in conditions which are absolutely unsuitable for people: first, where it is difficult to create the necessary environment for human life at all, and second, where the major expenditure is essential to ensure the necessary standard of comfort for human work (lighting, heating and so forth) in ordinary conditions.

Cooperation between the CEMA countries in this sphere largely relies on national programs. In the USSR, for instance, in effect a new sector of machine building is being created for the production of industrial robots. In the current 5-year plan, the program for robot production has entered the stage of wide introduction of robots into production. Some 5,000 robots are already in operation in the country, and by the end of 1985 there will be tens of thousands of them. The introduction of robots in the 11th 5-Year Plan will make it possible to save more than R300 million a year and to release some 100,000 workers. Here we have in mind first and foremost the areas of production where there is a manpower shortage and where the working conditions are harmful and dangerous to man.

The CEMA countries' cooperation in robot building under the agreements signed provides for the elaboration of a unified technical policy in this sphere and the implementation of extensive unification and standardization. The importance of this is clear from the predictions of specialists in the scientific and technical directions of the development of robot building. These predictions show that by 1985 a large proportion of robots will be equipped with highly developed senses (including technical vision) and microprocessor control, while by 1990 the main types of robots will be equipped with the components of an artificial brain.

It is expected that by 1990 the total robot pool in the CEMA countries will reach 200,000.

The implementation of the programs adopted and agreements signed in the sphere of microelectronics and robot building will strengthen the foundations for the retooling of the fraternal countries' national economies and the automation of production processes in industry and agriculture and many types of operations in the administrative sphere and will make it possible to reduce the use of manual labor and save energy, raw materials and other materials.

Other Spheres of Collaboration

The session examined questions of the development of cooperation in other spheres of great significance for scientific and technical progress and for increasing the national economic efficiency of the CEMA countries. In particular, it examined progress in fulfilling the agreement on multilateral international specifialization and production sharing and reciprocal deliveries of equipment for nuclear power stations, signed at the 33d CEMA session (1979) and covering the period 1981-1990.

Under this agreement, approximately 50 percent of basic equipment is to be produced in the USSR, the other 50 percent in other participating countries.

It can already be noted that the agreement's implementation has had a considerable effect on the formation and successful fulfillment of national programs for the development of nuclear power and has created the conditions for accelerated growth in this new, highly promising sector.

The present contribution of the nuclear power industry to the CEMA countries' economy is very substantial. In some countries about 20-25 percent of the total electricity generated comes from AES's. And as specialists note, the coefficient of utilization of capacities at these stations is significantly higher than at conventional power stations working on organic fuel, while the cost per kilowatt-hour of electricity is lower. This makes nuclear power a progressive direction in the future resolution of the fuel and energy problem.

Special significance is now attached to cooperation in resolving problems of food supplies for the population. The Food Program adopted in the USSR provides for extensive development of such cooperation. Speaking at the 36th CEMA session, N.A. Tikhonov particularly noted that while making the maximum use of our own potentials, we hope that the Food Program's implementation will at the same time be promoted by cooperation with other CEMA countries.

In elaborating and approving the avenues of mutual cooperation, the CEMA countries could not fail to draw attention to the increased complexity of the international situation as a result of the policy now being pursued by imperialist states--a policy of whipping up the arms race and interfering in other states' internal affairs. It was noted at the session that imperialist circles in the United States and a number of other NATO countries, with a view to exerting political pressure, have toughened their discrimination with respect to CEMA countries and embarked on the application of "sanctions" and the curtailment of trade and economic ties with them, in particular Poland and the Soviet Union. The illegal policy of economic blockade against fraternal Cuba is being stepped up. The Versailles conference showed that the main imperialist countries are setting a course of further complicating trade, credit and other economic relations with the CEMA countries.

The session's resolute condemnation of the actions of imperialist circles in the United States and its allies aimed at complicating trade and economic relations with the CEMA countries reflects the fraternal communist and workers parties' consistent line on strengthening peace and preserving detente and developing broad cooperation with all countries which acknowledge the principle of equality and mutual advantage. The session's decisions will promote the implementation of the course elaborated by the congresses of the CEMA countries' communist and workers parties for the further development of cooperation with developing countries, in particular countries oriented toward the socialist path of development.

The development of all-round cooperation between the CEMA countries and the deepening of socialist economic integration is a reliable path to the successful resolution of the socioeconomic tasks set by the congresses of those countries' fraternal parties.

CSO: 5100/2231

BRIEFS

FILIPOV AT KOZLODUY PLANT--On 27 July Comrade Grisha Filipov visited the most important power project of the current 5-year-plan period--the construction of the fifth block of the Kozloduoy nuclear electric power plant. At a meeting with construction workers, fitters and investors, Nikola Todoriev, minister of power supply, briefed Comrade Grisha Filipov on the construction timetable and the progress of construction. He stressed that construction work continues around the clock, with full mobilization of the work force and equipment. Comrade Grisha Filipov positively evaluated the results which have been achieved and gave some instructions on accelerating construction and fitting work and on commissioning and activating the fifth nuclear reactor on time. The meeting was attended by deputy ministers, responsible workers of central departments, okrug leaders and specialists working at the plant. [Text] [AU271545 Sofia Domestic Service in Bulgarian 1500 GMT 27 Jul 82]

CSO: 5100/2231

VICE PRESIDENT EXPLAINS NUCLEAR WEAPONS POLICY

No Weapons Development

PY152318 Sao Paulo FOLHA DE SAO PAULO in Portuguese 18 Jun 82 p 5

[Excerpt] Rio de Janeiro -- The Brazilian Government's position of not developing nuclear weapons is "implicit" in the nuclear agreement signed with the FRG, "but to date we have never said anything explicitly on the subject," Vice President Aureliano Chaves stated yesterday. The vice president declined to say whether Brazil intended to produce nuclear weapons in the long term, stating: "One cannot anticipate the future."

Aureliano Chaves recalled that Brazil did not sign the Nuclear Nonproliferation Treaty (1968) and has not ratified the treaty banning nuclear weapons in Latin America (Tlaltelolco, 1967). Meanwhile, in the nuclear agreement with the FRG, Brazil commits itself to "using nuclear development for peaceful purposes" only.

"More important than any statement is peaceful behavior. We behave peacefully and we have a formal position in favor of peace and the peaceful resolution of differences between countries," the vice president added. Accompanied by Minister Maximiniano da Fonesca, the vice president was observing military exercises aboard the aircraft carrier Minas Gerais.

The vice president defended "making the armed forces adequate to the importance and responsibilities Brazil has in the world today." Chaves made the reservation, however, that "this does not mean I am proposing an arms race." For him, "The fundamental problem for any armed forces is to create technology to achieve a certain degree of autonomy in relation to foreign equipment."

Sao Paulo Nuclear Plants

PY160045 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 10 Jul 82 p 1

[Text] Sao Paulo will have four nuclear powerplants, Electrobras President Gen Costa Cavalcanti announced officially yesterday. Along with Peruibe 1 and 2, Sao Paulo will have two more of the eight called for in the Brazil-FRG nuclear agreement.

Two others are under construction in Rio de Janeiro (Angra 2 and 3) and the remaining two should also be located on the Rio-Sao Paulo axis, although the possibility exists that Ceara will be given one of the powerplants in order to take advantage of the Itataia uranium deposit, the largest in Brazil, with deposits of 137,500 tons.

CSO: 5100/2231

URANIUM RESERVES IN ITATAIA EXPECTED TO IMPROVE RANKING

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 4 Jul 82 p 47

[Report by special correspondent Milano Lopes]

[Text] Itataia--In less than 2 years, Brazil has become the fifth-ranking country in the world in uranium reserves, with 266,300 tons, being outranked only by the United States, Canada, Australia and South Africa. But its position in that ranking may improve even further this year on the basis of the results of new explorations being conducted in the Northeast, involving more than 24,000 square meters of drilling.

Of the 266,300 tons of uranium in the Brazilian reserve as of the end of last year--140,500 being measured and indicated, or reasonably certain, and 95,800 inferred or additional estimated--more than half is located in the uranium-bearing area of Itataia in the state of Ceara, in a small square of land of an old cattle ranch 200 kilometers from Fortalexa. The Itataia reserves amount to 137,500 tons, 83,000 being measured and 54,500 inferred.

Mountain of Uranium

Itataia is located in one of the driest areas in the state of Ceara and despite the fair winter this year, the impression one gets on arriving in the region, after traversing the well-maintained 46-kilometer-long dirt road, is a landscape of desolation and abandonment.

However, in direct contact with the Brazilian Nuclear Corporation (NUCLEBRAS) technicians and workers who are conducting more drilling and reparing the infrastructure for the installation of a pilot plant which will determine the appropriate process for the future large-scale production of uranium hexafluoride or yellow-cake, one gets another impression. And attention is drawn toward a mountain from the peak of which overhand reddish rocks that indicate a high level of radioactivity at the simple approach of the measuring equipment.

And the most impressive thing is that that whole mineral mass is restricted to a square of little more than 1.5 kilometers, representing the greatest concentration of uranium ore known in such a small area. In addition, since the uranium is in view, its extraction in the initial stage will be open-pit, that is, removing the mineral mass on the surface, substantially reducing the expense of mining.

In addition to Itataia, NUCLEBRAS' explorations have identified as a sort of extension of that area the deposit of Alcantil, 7 kilometers to the east, and of Serrotes Baixos, 37 kilometers to the west, with reserves of 7,000 and 8,000 tons of uranium, respectively. Those two new areas are being intensively worked over, and everything leads to the belief that there will be a substantial increase in the reserves of the uranium-bearing area of Itataia this year.

Since NUCLEBRAS began its work in Itataia 5 years ago, 288 perforations have been bored, totaling 65,202 meters of drilling to explore the depth limit of the mineralization. Seventy-one thousand samples were collected for laboratory analysis, with which 506,000 analytical assessments were made (analysis for uranium, phosphates and other important elements in the process of extracting the uranium) with a view to indicating the most appropriate treatment to be given to the ore.

In addition to the drilling work, NUCLEBRAS opened up three underground galleries in Itataia, totaling 1,269 meters for the purpose of cutting the body of the ore. The aim was to obtain more data on the form and geometry of that mineral body and to collect more representative material for beneficiation tests of the ore, that is, tests whose objective is to determine the easiest way to extract the uranium.

Pilot Plant

In order to obtain the parameters necessary for the construction of a mining-industrial complex with a production capacity of 3,000 tons per year of uranium concentrate, which should go into operation beginning in 1991, a pilot plant will be built in the area of the deposit. Work on it has begun with the construction of a dam that will accumulate 300,000 cubic meters [of water] which will be ready within 2 weeks.

In Itataia, the following activities will be carried out: mining and handling of the ore; physical concentration of the ore by flotation; chemical opening of the concentrate for the production of phosphoric acid; recovery of the ore for extraction with solvents; and concentration of the phosphoric acid produced. The pilot plant will produce 50 tons of yellow-cake, 6,300 tons of phosphoric acid and 26,000 tons of sulfuric acid annually and employ 180 persons; it is scheduled to go into operation in 1986.

After 2 years of operation and once the best extraction process has been determined, the subsequent stage will be the installation of the industrial plant which, in the three alternatives set up, will move 1.82, 3.64 or 5.46 million tons of ore; will produce 1,000, 2,000 or 3,000 tons of yellow-cake; 150,000, 300,000 or 450,000 tons of phosphoric acid, and will employ 809, 987 or 1,200 persons, respectively.

Selection of the appropriate alternative for the beginning of production will depend on some factors such as the market--part of the production will be for export--domestic consumption needs, and the availability of investment funds. The most serious problem in the region, the lack of water, will also be resolved for the industrial plant with the construction 30 kilometers from Itataia of the Serrote Dam with an accumulation of 30 million cubic meters of water.

8711
CSO: 5100/2220

CALS ANNOUNCES ESTABLISHMENT OF NUCLEAR FUSION CENTER

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 3 Jul 82 p 25

[Text] Rio--Speaking at the War College (ESG), Mines and Energy Minister Cesar Cals announced the establishment of the National Plasma Physics and Nuclear Fusion Center in Itaguai which will group together in one single site eight groups of Brazilian scientists who are conducting research on plasma and fusion through the use of laser rays contained within magnetic fields.

With regard to the nuclear program, Cals said that the government has decided to order new nuclear power stations only when the fuel cycle technology has been defined. He explained that the German-Brazilian nuclear agreement envisages eight power stations but only four are designated on behalf of Germany. The remaining four will be ordered by international bids, and the only thing that is guaranteed is that KWU will be given priority. Since the four remaining plants are not committed by trade agreements, the matter remains to be resolved during the administration that succeeds President Figueiredo.

With regard to the uranium enrichment process, the minister of mines and energy explained that he went to Germany and wanted to find out in Siemens, which is developing that technology, if the ultracentrifuge is a process much superior to the one supplied to Brazil. He learned that, in fact, the ultracentrifuge is much better, with a consumption of 200 kilowatt hours per unit of separating time (UTS), while the jet-nozzle process consumes much more energy, about 3,300 to 3,500 kilowatt hours/UTS. However, Germany does not own the patents for that technology, which is shared with other partners. If the jet-nozzle is not the best process, it at least is the one available at the moment, the minister explained to the ESG cadets.

Cals also said that he confirmed that the Germans are making some progress in the uranium enrichment process, in the sense of reducing the high consumption of electric energy. He announced also that the Brazilian Petroleum Corporation (PETROBRAS) is establishing an office in Rotterdam (where the oil free market is located) for fast exchanges of information and to follow market trends. Brazil will try to sell domestic market surplus oil derivatives there.

Another subject taken up by the minister was the establishment of the trinational PETROLATIN, which will have the participation of Mexican Petroleum (PEMEX), Venezuelan Petroleum Corporation (PETROVEN), and PETROBRAS, for the exploration and marketing of oil. He revealed that it will be capitalized at $2.4 million and that the company is not being viewed favorably by the oil multinationals, which fear competition."

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CSO: 5100/2220

BRAZIL

FURTHER DETAILS ON CTA MILITARY RESEARCH REPORTED

Rio de Janeiro JORNAL DO BRASIL in Portuguese 10 Jul 82 p 12

[Article by Eneas Macedo]

[Text] Sao Paulo--The Aeronautics Technical Center (CTA) in Sao Jose dos Campos is developing nuclear technology unprecedented in this country aimed at construction of fast-breeder reactions and the use of laser rays in the fission of fuel elements. The objectives of the work are military and aim to obtain a sufficient quantity of plutonium before the end of the century to begin production of military nuclear devices.

The project, which is based on the use of uranium and thorium, is being developed by the Advanced Studies Institute (IEA), a department created in the CTA especially for this purpose. The work has the research support of the Energy and Nuclear Research Institute (IPEN) of Sao Paulo and the University of Campinas (UNICAMP), the strategic support of the National Nuclear Energy Commission (CNEN), and funds of the Bank of Brazil. Due to their essentially military nature, the research is disassociated from the Brazilian-German atomic program and is outside of Brazilian Nuclear Corporation (NUCLEBRAS) coordination.

Chance Beginning

Nuclear research in the CTA area began fortuitously in the last decade when the Aeronautics Center sought to develop a zirconium alloy for the construction of planes. Since that metal is associated with uranium to a very high degree, the technicians at the center began to experiment with that nuclear element but without military aims.

That concern arose in 1977 when the IEA was created, an advanced studies laboratory organized by Col Jose Albano do Amarante. Until the end of that decade, the work centered on determining integrated technologies that would make it possible to obtain in the shortest possible time the elements necessary for the manufacture of nuclear weapons, in this case, plutonium, the production of which will be very low in the future reactions of the Angra-II and III type.

A board of scientists comprised in its majority by military men opted for two types of equipment in the future: fast-breeder reactors and the enrichment of uranium by laser rays, two technologies that are still practically in the laboratory phase in the most advanced countries.

The pace of the whole project was slowed after the death of Colonel Amarante last year and was not resumed after the installation of the new head, Col Reginaldo Santos. The high-level team directing the work is comprised of 6 Ph.D scientists and 12 masters. One of those specialists described the present stage of the project as academic and said that construction of the prototypes has not even been thought about since the reactor engineering division has not been formed.

The fast-breeder reactors use natural uranium (heavy water) as a moderator to set off the apparatus which, in a second phase, begins to burn thorium-232. For military purposes, it presents the great advantage of producing 10 times more plutonium thatn Brazil will produce with German technology. The Brazilian reserves of thorium exceed 80,000 tons and the most advanced technology on the subject is in France, the Soviet Union and Great Britain. IEA experts estimate that that technology will not be mastered by Brazil until the end of the century.

8711
CSO: 5100/2220

FURNAS DEBT TO SUPPLIERS REACHES 14 BILLION CRUZEIROS

Sao Paulo FOLHA DE SAO PAULO in Portuguese 20 Jun 82 p 38

[Text] Rio--Furnas Power Stations will suffer a large part of the loss due to the delay of Angra-I, despite the fact that the defect in the nuclear plant's steam generator was the exclusive responsibility of Westinghouse because of a design fault and that the purchase was made as a closed package deal. Whereas Westinghouse has obtained a profit of $118.5 million in the first quarter of the year, Furnas has already accrued a debt to the suppliers of about 14 million cruzeiros.

To win the competitive bid, the American company designed a preheating chamber in the steam generator, increasing the plant's yield by 3 percent. And it was precisely that chamber that caused the corrosion of the pipes in three other plants (Almaraz, Ringals and McGuirre) with idential designs as that of Angra-I. All of them will have to be modified.

The defect was detected in October of last year and it was only in May that Westinghouse held out promise of a solution, still to be tested in the American reactor. Despite the expectation that Angra-I will go into commercial operation by the end of the first quarter of next year, in fact it becomes quite difficult to establish timetables. The Brazilian plant will be modified only after the new design is tested and approved in the United States.

Commitments Broken

Initially scheduled to go into operation in 1977, Angra-I suffered all sorts of adversities, even the construction of the neighboring plant weakened the structures of the project, causing the settling of the turbine building. The delays began to succeed one another and the [cost of the] unit went from $33 million to $1.4 billion--for the time being.

With the new problem of the generator, the plan can only operate up to 30 percent of its 626-megawatt capacity because at this power the upper water intake of the generator is used, avoiding the preheating chamber area. At a higher power, it becomes necessary to use the lower opening of the equipment, which would cause vibration of the pipes and later corrosion, as occurred in the units in Europe and the United States.

Westinghouse has agreed to modify the generator and pay for the repairs. In the meantime, Furnas will bear the burden of the whole infrastructure to enable the repairs to be made, without considering the time that the idle plant is not generating revenue. In that connection, the unit is operating at 30 percent because a stoppage could affect the equipment similar to what happens when a car stays in a garage for a long time without being run. The stoppage of the plant would also mean a demobilization of the technical staff.

Of the total cost of $1.4 billion, approximately $280 million was spent on the civil engineering work and about $1 billion on equipment. According to Furnas' information, over and above the total for the plant, another 30 percent should be added for financing expenses. In the meantime, the new delay means an expenditure of $140 million to cover financing costs without considering the expenses of operation without producing energy.

Angra-I even had problems with the fuel. After it was purchased from the United States, the U.S. Congress vetoed the supplying of sensitive material. But Brazil has an agreement with URENCO (a consortium comprised of Germany, the Netherlands and Great Britain) initially signed for the plants in the agreement with Germany but which can also be used for recharging Angra-I.

Other Units

While the problems with Angra-I continue, the two subsequent units proceed with their work after a 5-year delay due to the problems with the foundations of the second power station. Angra-II concluded the heading slab in November and is beginning the superstructure of the reactor building, with the preassembly of the containment sphere; the electromechanical installation of the equipment is envisaged for the beginning of 1983.

In the meantime, Angra-III is in the excavation phase. Beginning of the civil engineering work is expected in the last quarter of this year. The competitive bidding phase has not yet ended. Norberto Odebrecht was in charge of the civil engineering work of this plant but when it passed to the responsibility of the Nuclear Power Station Construction Corporation (NUCON), a subsidiary of the Brazilian Nuclear Corporation (NUCLEBRAS), new bids were called for.

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CSO: 5100/2220

BRIEFS

FIRST NUCLEAR PLANT BY MID-1983--Rio de Janeiro, 12 Jul (TELAM)--Mines and Energy Minister Cesar Cals announced here today that the first Brazilian nuclear powerplant will be operating at "full capacity" before the middle of 1983. The minister revealed that a new system will be installed in October 1982 at the "Angra I" powerplant to replace heat-producing equipment that had technical problems. Therefore, the plant will be operating at full capacity 6 months later. The part which caused a 1-year delay in the operation of the plant, located 120 km south of Rio de Janeiro, will be supplied by the U.S. company Westinghouse. The minister said that as soon as the first problem was detected at the plant, Brazil adopted a cautious policy of carrying out operation tests at only 30-percent capacity, "something quite different to what happened in Spain and Sweden where serious problems occurred because plants were run at 90-percent capacity."

CSO: 5100/2231

PREPARATIONS UNDERWAY FOR PUTTING KOEBERG INTO OPERATION

Johannesburg THE STAR in English 17 Jul 82 p 5

[Article by Chris Erasmus: "Like It or Not, SA Is About To Enter the Nuclear Age"]

[Text]

Melkbosstrand residents near Cape Town heard the eerie wail of sirens as Koeberg's personnel and safety precautions were put through their paces during a simulated crisis.

The exercise, watched over and conducted by the Atomic Energy Corporation, marked the final stage of preparations before South Africa's first nuclear power station comes on line early next year.

According to Escom, Koeberg will save 100 million litres of fresh water and 16 000 tons of coal a day compared with 2 000 megawatt coal-fired stations using cooling towers. This means a saving of about 200 million tons of coal during its operating lifetime. A significant figure in anyone's book.

But it has been a long haul since the early days when the notion of a nuclear plant situated near Cape Town was first mooted in the early 1970s. The story of the plant's construction is a mixed one.

Building on the 3 000 ha Melkbosstrand site began in 1977. At the time Mr Chris Heunis, who was then Minister of Economic Affairs, estimated cost of the project would be R970 million and its projected date of completion was set for some time in 1985.

Within a few months of the first dunes being cleared of the Port Jackson willows that estimate had climbed, and some analysts were warning that the cost of building the nuclear plant might eventually top R2 000 million.

The sceptics who had predicted the effects on building costs of rising inflation were proved correct and by November last year the estimated cost of the nuclear power station was put at R2 300 million.

There have been other problems too.

As Capetonians began to realise that a nuclear power station was to become a reality in their own backyard, so too a vociferous anti-nuclear lobby emerged armed with frightening stories of the potential hazards of nuclear pollution.

Soon claims and counter-claims were flying freely between the concerned "anti-nuke" lobbyists and various experts within the Government and Escom.

The "anti-nuke" lobby, supported by Mr Jim Harding, a former adviser to the California Energy Commission, questioned claims made by Escom's chief nuclear engineer, Mr J R Colley, and others that Koeberg was the safest of its kind in the world, was designed along the most up-to-date lines and would be economical in comparison to similar-sized fossil-fuel burning power stations.

Emotive scenarios of mass death, destruction and lingering suffering were painted by those fearing sabotage of the nuclear plant or some natural disaster such as an earthquake exposing the volatile core of a reactor.

These and other less dramatic fears of contamination which might result from a leak of radioactive materials from the plant into the atmosphere have been repeatedly allayed by Escom and Government experts.

Escom claims to have spent eight years investigating all pros and cons of the project and millions of rands have been invested in survey and analysis operations as well as the extensive safety precautions which were tested for their efficiency this week.

But for some no amount of denial or assurances of intricate and well-tested safety measures will be sufficient.

In spite of the grim, if extremely unlikely, possibility of a man-made or natural disaster, construction went ahead and the existence of a soon-to-be operative nuclear power station has become a fact of life in the Peninsula.

Another major difficulty emerged when a deadlock between the United States Department of Energy (DOE) which had agreed to enrich South African uranium, and Escom developed in 1981, threatening to leave Koeberg without fuel for its two reactors.

Escom was refusing to supply DOE with the 300 000 kg of uranium ore because in terms of the US Nuclear Non-proliferation Act of 1978 export of enriched uranium to South Africa was banned.

The problem was overcome, however, when South Africa came up with an 18-month supply of enriched uranium hexafluoride from an unknown source. Dr Ampie Roux, chairman of the Uranium Enrichment Corporation, said in April last year that South Africa would eventually be able to produce the 50 tons of enriched uranium needed to fuel the plant's reactors annually.

But behind all the publicity and drama work at the Melkbosstrand site was progressing and slowly but surely construction was moving ahead under the direction of the four French companies, Framateg, Framatone, Spie-Batignolles and Alsthom - Atlantique, who were contracted by Escom to build the station.

The first reactor was completed on schedule in 1981 and was "hot tested" in April this year.

Last week Escom confirmed that the first deliveries of the enriched uranium had arrived at the plant and that the number one reactor would soon be loaded.

The number two reactor will also be ready for testing and loading in the near future.

When the station is operating to its full capacity towards the end of next year, it will contribute 1842 megawatts to the national grid — about 10 percent of South Africa's entire power output.

Whether for or against, whether pro-nuclear, or anti-nuclear, South Africans must accept that with the firing of Koeberg's first reactor they will have entered the nuclear age.

And until a viable alternative to nuclear energy is developed South Africans can look forward to an era in which the energy of the atom will play an increasingly important part in their lives.

CSO: 5100/5691

CORRESPONDENT SCORES 'OVER-EMPHASIS ON NUKES'

Johannesburg THE CITIZEN in English 4 Aug 82 p 6

[Article by Aida Parker: "A Psy-war 'Bomb' To Blast Communism"]

[Text]

DOES South Africa possess nuclear capability? The latest contribution to that long-standing debate comes in a new Corgi publication, Two Minutes Over Baghdad, just arrived in Johannesburg.

According to this, a hush-hush, triple-state "nuclear axis" comprising Pretoria, Jerusalem and Taipeh has jointly succeeded in developing a devastating "neutron bullet", a 155-mm cannon shell fitted with a neutron warhead, and is now proceeding with a common effort to develop a Cruise missile with a 2 400 km range.

All this is exciting stuff, expecially to our overseas critics who froth at the mere thought of South Africa having a "bomb in the basement".

But it does raise an interesting point. Why this continual over-emphasis on nukes? Even if it had the Bomb, it is most unlikely South Africa would ever use it.

But what our friends in Taipeh and Jerusalem can offer is a "bomb" of an entirely different nature, one which (skilfully used) could ultimately have far greater fall-out.

That is mind control, the most powerful force in the world today, so well understood by the communists, so little understood by the West in general and South Africa in particular.

While in Taipeh recently, I was privileged to meet General Wang Sheng, director of the Political Warfare Department of Free China's Ministry of National Defence.

While perhaps not a household name in non-military circles, General Wang is certainly well known to defence departments throughout the West.

In these circles, he is hailed as a modern-day Confucius, perhaps the greatest expert in psychological warfare in the world today.

If he has any competition in this rarefied sphere, it is in the USSR and Red China, not in the West.

By any standards the urbane, intelligent, intellectual General Wang must be one of the most fascinating men alive. Had the Americans heeded his advice early on during the Vietnam War, much of Indonchina's later tragedy might well have been avoided.

For nearly 40 years now General Wang, who arrived in Taipeh with General Chiang Kai-Sheck after the communist take-over of mainland China, has been engaged in a ceaseless battle of wits with the Reds.

He played the key role in setting up Taipeh's famous Fu Hsing Kang College (Political Staff College), an institution dedicated to the study of psychological warfare and so respected that officers from 27 Western states (including South Africa) have gone there to study this new science of "psy-war".

Free China is believed to be the only Western nation with a formal political warfare division in its Central Governemnt.

Yet even in Taipeh political warfare is still so little understood that most people seem to identify the department as some sort of organisation of "spooks" — secret agents.

Let's see what General Wang has to say about that.

First though, what manner of man is he? He was born in Kiangsi Province in Southern China on October 28, 1917, into a nation ripped and torn by revolution.

He reflects on that time: "I loved to study and lived for a long time just for the pursuit of knowledge. But another part of me could not bear the agonies of the Chinese people.

"I wanted to serve the country. Thereupon, I enlisted in the military."

However, he never led troops and never saw battle. What he did do was begin a lifelong study of the communist techniques of "ideological conquest" — direct attack upon the human mind, more commonly known today as "winning the hearts and minds of the masses."

Foreign visitors often express curiosity about psy-war. "I patiently explain," he says, "that political warfare is a necessity. Mere armed defence is no longer enough against the enemies of our values.

"The biggest military budget conceivable is inadequate without accompanying ideological effort.

"The final outcome of the present titanic struggle for world supremacy cannot and will not be decided by military action alone: To ignore that is to invite disaster."

What exactly is psywar? "The scientific use of thought and philosophy on a battleground of intellect. The communists are experts at manipulation and controlling thought.

"By mounting a ceaseless campaign of slander against the target country, by shattering the enemy's political confidence, by weakening his will, confusing him, they defeat him at the root, destroy his survival virtue."

The answer? "Communists use political warfare: but they fear it, too."

Here he insists that the story of Vietnam should serve both as an example and a warning.

He went there many times for on-the-spot study of the coldly calculated, step-by-step internal destruction of South Vietnam, as it was slowly eaten away by Red experts in thought control and manipulation, aided by fellow travellers in the US itself.

"Southern Vietnam had the military support of the US, Canada, Thailand, the Philippines and South Korea. Militarily, it should not have fallen.

"The reason for its collapse was political warfare: the disuniting forces and political propaganda created and disseminated by the communists and their associates.

"Rifts resulted between Buddhists and Christians, students and government, and ultimately in policy between the US and South Vietnam."

To one familiar with the practice and techniques of psy-war, it was painfully evident what was happening. But when General Wang warned the Americans of the tactics being used, "no one believed me."

Here he comments: "Remembering Vietnam, I implore all freedom-loving countries to be vigilant, to strengthen their unity, to recognise the warfare being waged against them, to actively counteract the unseen communist threat.

"Only then can countries resist being literally splintered to death by this very experienced enemy of all freedom in the world."

How does he handle the situation in his own much-threatened nation? All soldiers, down to the lowest-level serviceman, have to undergo psy-war training.

"The enemy is immensely powerful, but he is not invincible. In a dangerous world, political warfare can provide us with a non-military weapon which we can use to prevent us ever having to use our military weapons.

"Above all, our people must be taught how to distinguish friend from foe, not to open the door for the robbers, as the Chinese saying goes."

Recent revolutions in communications technology, he says, have "revolutionised the arts of war. It is easier to forge effective ideological weapons against communism than it has ever been."

Many in South Africa, where the communists stand at our very door, understand General Wang's message. Certainly, the SADF knows what he is talking about. Far too many politicians do not. Since Info, propaganda has had a bad name in this country.

Says one domestic critic: "We do use propaganda methods, but on a limited scale and generally badly.

"Overall, our propaganda programme is deficient both in quality and quantity, underfunded, lacking in sophisticated technology. Repeatedly, the communist message goes forth without rebuttal."

Perhaps, if the West would listen to General Wang, people of future generations will ask: "What saved the world from communism?"

The answer could well be: Fu Hsing Kang College and its mastermind, General Wang.

CSO: 5100/5691

ATOMIC ENERGY OFFICIAL ON NONPROLIFERATION PACT

LD231022 Moscow TASS in English 0935 GMT 23 Jul 82

[Text] Moscow July 23 TASS -- "The 25 years of the International Atomic Energy Agency (IAEA) have shown that it has been fully up to the functions assigned to it. The task of making peaceful uses of atomic power, which was entrusted to it, is being successfully performed," Andronik Petrosyants, chairman of the USSR's State Committee for the Use of Atomic Energy, writes in the weekly NEW TIMES [NOVOYE VREMYA] today.

"The agency's extensive control system in the form of a package of rules and provisions concerning the use of all types of nuclear materials, the so-called IAEA safeguards system," the author says, "should make the governments and the public more confident that the development of the nuclear power industry does not lead to the proliferation of nuclear arms."

"A large number of states has arrived at the conclusion that the renunciation of nuclear arms cprresponds to the interests of their security, as a result of which as many as 118 countries have joined the non-proliferation treaty."

"At present," the article goes on, "the IAEA safegards over 98 percent of the nuclear reactors of all countries which do not possess nuclear arms, except four states. But it is precisely these four states, including Israel, that make the world community most concerned. Israel has not signed the non-proliferation treaty and has not accepted the IAEA's control and safeguards. The Israeli Government is flouting all international norms and principles with the direct backing of the United States."

Andronik Petrosyants expressed concern at the fact that the Israeli armed attack against an Iraqi nuclear research centre outside Baghdad, which is under the IAEA's control, could set an example for others. He writes: "This is why it is so important to ensure that all states will join the non-proliferation treaty and observe it."

CSO: 5100/2231

SWEDEN, DENMARK TO STUDY SAFETY OF SWEDISH NUCLEAR PLANT

Stockholm SVENSKA DAGBLADET in Swedish 16 Jun 82 p 6

[Article: "Barseback. Danish-Swedish Report"]

[Text] The Swedish government agrees to form a joint Swedish-Danish committee to report further on the risks of a serious accident at Barseback Nuclear Power Station.

This is what Labor Market and Energy Minister Ingemar Eliasson (People's Party) writes to the Danish Environmental Minister, Erik Holst, reports TT.

In the letter Eliasson proposes that the committee should first of all work on two problems: To throw light onto the probabilities for conceivable breakdowns at Barseback and various safety measures, and to study how the safety problems have been treated in other countries where nuclear power stations lie close to national borders or larger cities.

A Danish proposal says that the commission should work according to the Nordic Environmental Protection Convention from 1974. This means that the commission should have the right to make statements on problems related to conditions for activities harmful to the environment--if the activity may involve environmental risks in both countries.

The Swedish government now points out that Barseback 1 and 2 received their permits in 1970 and 1972 and that the Danish authorities already then received information and an opportunity to speak up.

The Swedish government therefore believes that there is no reason for appointing a commission according to the Environmental Protection Convention from 1974.

8958
CSO: 5100/2200

BRIEFS

SPENT FUEL FROM SWEDEN TO FRANCE--This fall shipment of spent uranium from Sweden to the large reprocessing installation La Hague in France will start. Construction of a new unit at the installation owned by Cogema has just started, and it is at this unit that the Swedish nuclear fuel waste will be taken care of. The information became known when Cogema's customer association met in Stockholm with representatives for nuclear power companies in Japan, Germany, Switzerland, the Netherlands, Belgium and Sweden. For some time uncertainty prevailed about the future of nuclear power in France, but after a debate in the National Assembly, the program for the country was generally approved. Then the development started up again in La Hague. There is already an older reprocessing installation in operation, which takes care of 500 tons of fuel from light-water reactors and 4100 tons from gas-cooled reactors. [Text] [Stockholm DAGENS NYHETER in Swedish 17 Jun 82 p 18] 8958

CSO: 5100/2200

POLEMICS SURROUNDING NUCLEAR FUSION PROJECT 'IGNITOR'

Politics Versus Science

Rome LA REPUBBLICA in Italian 6 Jul 82 p 6

[Article by Carlo Bernardini, Felice Ippolito, and Gherardo Stoppini: "When Politics Fights with Science"]

[Text] The repeated and inaccurate disclosure of the size of Italy's economic deficit and its growth in the end relegates to second place the analysis of the quality rather than the quantity of this disaster. Still, it should be clear to everybody that the indication of the mere overall quantitative measure conceals and covers up more essential failures in government. It also seems obvious to us that the problems of quality cannot be taken under consideration in accordance with the order or sequence established by anonymous quantitative parameters but must instead be examined on the basis of their "germinal" capacity to produce future benefits (or damages). For example--and this is the case we want to talk about here--what we do or what we do not do in the field of scientific and technological research, no matter how modest, can have explosive or implosive consequences for the country's future.

The administration initiative in support of research should at the same time be cautious and determined. But the administration cannot "invent" research and therefore must concern itself with having efficient and competent persons in the commanding positions that control this sector. In other words, the administration must know how to choose, possibly outlining general objectives and waiting for the development of methods suitable for the attainment of those objectives. If, on the other hand, the criterion adopted is the criterion of considering the environment of research as a part of an electorate to be satisfied, then the results cannot be anything but occasional; we are naturally talking here about results of social significance, not about the consensus as such.

It seems to us that it is precisely this latter "electoral" criterion which has prevailed in Italy in recent years and that the special-interest method has broken all bounds also in this academic environment which, by virtue of its own cultural strength, could feel itself to be sufficiently authoritative to influence the problems of the quality of development. And there are signals here of a further deterioration of the situation which, since they are signals, must be picked up in the nascent state, when hopes of correction are not yet entirely dead.

One of these signals seems to us to be particularly indicative of this deterioration because it presents itself in a form which denotes the downfall of that residue of self-control which until a short time ago regulated the scientific community from the inside and that comes close to "disdain for institutions." We are talking here about what happened to the project for a prototype nuclear fusion plant called Ignitor. The project, whose scientific worth we are not questioning, sprang up in a climate of academic dyscarsy which certainly is nothing new but which, in the recent past, could be settled due to a certain degree of autonomy of this research environment from the political establishment. Those who advocated Ignitor however are discovering that it is possible to find political sponsors with whose help one can get to the final result without the usual examination processes. And they are pushing in that direction with an impressive press campaign which describes the marvels of this undertaking to unaware newspaper readers.

These somewhat pathetic forms of anticipatory triumphalism already constitute a significant change in the traditional scientific customs but they may be excused in terms of naiveness which is not a quality worthy of disdain, if they are not too openly aimed at grabbing peripheral scholarships. It takes at least 50 billion and it is not easy to get that kind of money by going through channels. We must realize that ENEL [National Committee for Nuclear Energy and Alternate Sources] (formerly the CNEN [National Nuclear Energy Commission]), with the approval of and the contribution of the European Community, set up a strictly similar machine at the Frascati Laboratories and has technologies and competence that were well consolidated throughout lengthy experience. The risk feared by the proponents of Ignitor is that they would have to arrive at a compromise if only because of the obvious convenience of using already existing facilities.

And that is where the subsidiary scholarship goes out the window: The Region of Piedmont, which has been interested in the project for more than a year. On top of that we can add, for what it is worth, the CNR [National Research Council], as well as Fiat (at least on the basis of an intention). Only the almighty knows what the region has to do with a program of national if not European importance.

One thing that is certain is that the undertaking makes it possible to avoid rather very detailed coordination with other similar activities. As for the rest, the ENEA itself had not yet as a matter of fact suppressed the project by financing it carefully only in the preliminary phase but the Ignitor Group obviously was not thinking of using this provisional institutional coverage to prepare itself for a serious scientific clash but rather to furnish information that would justify the request for other financing sources and for other agencies. These are justifying elements of information which today are fluttering in sound Christian-Democratic hands in the European Parliament, in the Region of Lombardy as well as in the Region of Piedmont, as well the Ministry of Scientific Research; anybody who would suggest a comparative study by a technical agency would, to say the least, be considered a saboteur.

How will all this end? Italy, a country with colossal deficits and with drastic spending cuts, will very probably order the go-ahead for three fusion programs without coordinating them: the FTU [Frascati Torus Upgrade] machine in Frascati, Ignitor, and the CNR program of Padua (very much more modest than the other two, to tell the truth). They give the reader an idea; the investments can be compared with those which the universities as a whole get in just one year (and which have been cut from 170 down to 90 billion for this year). Much taxpayer's money will therefore be wasted because a serious problem will not have been resolved. That is not the only example we could give. But we consider it advisable to report this in some detail because this is one of those cases in which serious and worthwhile projects in the end benefit from political corruption and that leads to some rather sad predictions.

Ignitor Experiment Opposed

Rome L'ESPRESSO in Italian 25 Jul 82 pp 119-120

[Article by Giovanni Maria Pace: "Ignitor against Everybody"]

> [Text] This is the name of new machine to produce energy. But the experiment is being opposed.

Rome. "This experiment must not be conducted!" Three outstanding members of the Roman scientific community--Carlo Bernardini, Felice Ippolito, and Gherardo Stoppini--sounded off on 6 July in LA REPUBBLICA. "We have everything in order to attempt it," replied the physicists at Turin and Milan, beyond the Gothic Line. The experiment involves nuclear fusion, the promising source of energy, and has been proposed by an Italian physicist who is doing research in America; his name is Bruno Coppi. Although Professor Coppi's name does not appear in the accusing article, it is he, his credibility as a scientist, and his capacity for prediction which are challenged. Is Coppi a precursor or a visionary? Will his machine work or will this not be a waste of 30 billion which it cost? In a field as new as plasma physics--the stellar state of matter which is recreated in the fusion reactor--there are only few experts. Even smaller is the number of those who can express judgments. "I cannot figure out why men such as Stoppini, Bernardini, and Ippolito are included among them," said Einstein Prize winner Tullio Regge who came out in support of Coppi. Against the background of the Ignitor case--this is the name of the machine to be built--we see the usual rivalry between North and South, between Roman centralism and local autonomy, between the various schools and groups of professors and their pertinent political "sponsors." Rarely in the august halls of sciences have so many excited voices been heard and it is rather strange that this dispute should center around a machine in which, for the first time, the fire of nuclear fusion, an inexhaustible, economical, and clean fire is to be lit. If it is lucky, Ignitor will deserve a place in history along with the Fermi pile. Why all this fuss? Here is how it all began.

About half a score of years ago, Professor Coppi launched a program for nuclear fusion at the MIT which included the Alcator machine; this machine differs somewhat from the prevailing line, the line of the big and expensive tokamak machines on which the Americans and Russians have concentrated their efforts. Alcator is a small, compact machine with which the MIT group achieved the world record in "confinement," an important stage in the race toward controlled fusion. But at the very moment it produced that result, Alcator reached its limit. It was necessary to go further, to build another machine in which one could check the "priming" of the deuterium-tritium mixture. This is the magic moment at which the plasma burns by virtue of its own energy, without any outside contribution. The new machine is the Ignitor. Coppi is preparing the blueprints for it with a view to Italy, also because in the United States, the golden land of technology, there is no facility suitable for this undertaking at this time.

From 1971 onward, Coppi also worked on the program for another machine for the Frascati Center (the Frascati Torus or FT). The new Ignitor project then received with favor but became involved in the slow and laborious routine of public research; months passed; news came from Moscow to the effect that they were also thinking of a similar prototype. Rome began to stir and the Region of Lombardy and the Region of Piedmont also became interested in the initiative. Both of them have facilities suitable for this experiment: Saluggia or the Euratom Center at Ispra which is chronically underused but which has the necessary electric power. During a solemn meeting in October 1981, the Region of Piedmont announced the start of the initiative in which various universities, the CNR and the ENEA (the former CNEN)--which is financing a project feasibility study--would be cooperating.

But signs of ill humor came from Frascati. The group that is working there on the FT (the creature of Coppi, even though people prefer to overlook that) want to put up a new machine, the FTU (Frascati Torus Upgrade) which should facilitate further progress, although not final progress, on the way toward fusion. What need is there for the Ignitor?--say the Roman physicists. From Padua there were complaints from another group working on a similar experiment although much more modest. In the meantime, the ENEA was caught up in the storm of doubt and President Colombo decided to subject Ignitor to a commision of experts from Euratom whose response is expected by the end of 1982. Professor Sergio Fubini and Giovanni Ferrero, the Piedmont advisor for culture, had already sent a circular letter to the world's major universities with this question: What do you think of Bruno Coppi as a scientist? The answers are rather flattering. Rosenbluth from the University of Texas, Dawson from the University of Los Angeles, Weisskopf from Cambridge, Mazzucato from Princeton, Chuyanov from Moscow, and Satoshi Hito from the University of Tokyo sang the praises of the Italian physicist.

Along with the wave of agreement there were also voices of criticism, such as those brought out in the article in LA REPUBBLICA. What in substance do Bernardini and the others say? Above all that Ignitor is springing up beyond almost any planning, so to speak, "as a form of disdain of institutions"; second, that its promoters are trying to avoid the normal processes of verification" thanks to the support of "political sponsors" (that might be the support of Christian Democrats); finally, that the Region of Piedmont, in adopting Ignitor, would be getting into things that are none of its business.

The physicists in Turin counter, saying that technical conditions for this experiment exist only in the North. "It is impossible to enlarge the machine at Frascati, as Bernardini suggested," said Professor Fubini, "because at that facility you cannot handle tritium for safety reasons. Besides, Ignitor is among the alternate machines which the European Community itself recommends for development along with the line of the big tokamak." At headquarters of the Region of Piedmont, it is said that about half a score of Italian Universities are interested in Professor Coppi's experiment and there is no reason why a local agency should not partly finance a scientific undertaking (the other money would have to come from Euratom, from the CNR, from the ENEA, and from Fiat). After all, did not the city of Hamburg build Desy, the big atomic center, in order then to turn it over to the community of researchers?

Ignitor remains a bet. Will Professor Coppi's small machine be able to trigger the first deuterium-tritium reaction? Not even its inventor is sure of the result: "We are like sailors looking for some sign of land," said Coppi. Along the frontiers of knowledge, where Ignitor is, there are no a-priori verifiable equations, there are no technologies that can be checked out in advance, there are no reliable models. But it is believed in many scientific circles that the stakes are worth the effort. The final word will come from the Euratom commission chaired by John Adams, a famous technologist. Until that time, the bitter debate on Ignitor seems to be made more bitter by jealousies and parochialisms rather than by strong reasons of scientific policy.

5058
CSO: 5100/2232

SWEDEN

CENTER PARTIES OPPOSE NUCLEAR PROLIFERATION

PM131111 Stockholm SVENSKA DAGBLADET in Swedish 11 Jul 82 p 6

[TIDNINGARNAS TELEGRAMBYRA dispatch]

[Text] Pajala -- the centrist movement in the Nordic countries should intensify their cooperation to bring about better guarantees against the spread of nuclear arms," Swedish Industry Minister Nils G. Asling (Center Party) said on Saturday [10 July] when he opened the 1982 Green Scandinavia [Grøena Norden] meeting of the Swedish, Finnish and Norwegian center parties.

"The risk that enriched plutonium produced from peaceful nuclear power station waste could fall into the hands of nuclear arms manufacturers should be a devastating argument against enrichment for all those who take an interest in disarmament question. In this light it is remarkable that the Swedish Social Democratic Party, despite the growing numbers of reports of the risks, has moved over to an increasingly positive attitude," Asling said.

"Support should be given to enable the serious peace movement to put pressure on the nuclear powers to bring about real disarmament. Nordic cooperation is a good example of the fact that freer relations between states make a contribution to peace, security and freedom for individuals.

"The Falldin governments have made contributions to the special UN disarmament conferences, through the factual material they have presented and the arguments against rearmament in the light of the enormous danger to the environment a nuclear war would present and the consequences such a war would have for underprivileged parts of the world.

"Center parties must continue to make active contributions to disarmament work and, most of all, contribute to the removal of the nuclear threat," Asling said.

CSO: 5100/2231

BRIEFS

SPENT FUEL FROM SWEDEN TO FRANCE--Ringhals 3 after test operation. Worse damage than expected. The steam generator at Ringhals 3 does not hold even for limited operation. This is clear after 1500 hours of test operation caused more wear damage than expected. The leakage in Ringhals 3's steam generator was discovered in October 1981. In order to obtain a technical background, the State Power Board requested permission to run the installations on test and at a low power level in order to see how the damage would develop. "The results show an alarmingly high wear," says Lars Nordstrom in the State Nuclear Power Inspection. "We had believed that we should be able to run for a fairly long period of time at reduced power. Now we find out differently. But is not impossible that there may be continued test operation." The Swedish nuclear power stations were shut down quickly nine times during the first quarter of this year. The most serious disturbance was the fire in unit 1 in the Oskarshamn station in February. This is clear from the quarterly report by the Nuclear Power Inspection (SKI). During the period only eight out of nine units have been in operation. The ninth, Ringhals 3, has been out of operation since October 1981 due to steam generator damage. The Swedish nuclear power units have been shut down for a total of 2959 hours during the quarter due to disturbances. Only Oskarshamn 2 has operated continuously without shutdown. Svensk Karnbransleforsorjning AB (SKBF) has during the period requested permission to build an installation for final storage of waste from all nuclear power stations in Sweden. The installation was to be built at Forsmark's nuclear power station. Waste from the central storage for spent nuclear fuel, which is now being built in Simpevarp, should finally be stored here. The State Power Board, the owners of Ringhals 4, would during the period have startup permission for this. Since unit 4 is virtually identical to Ringhals 3, where problems have shown up with the steam generator, Ringhals 4 was not allowed to start as usual, except with reduced power. [Text] [Stockholm DAGENS NYHETER in Swedish 17 Jun 82 p 18] 8958

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END

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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 160

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WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 160

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CHEYSSON CITED ON NUCLEAR FUEL TO INDIA

OW081901 Beijing XINHUA in English 1852 GMT 8 Aug 82

[Text] New Delhi, August 8 (XINHUA) -- France will not ask for any special safeguards or joint determination for reprocessing spent fuel from India's Tarapur atomic power plant under a proposed agreement on uranium supply to India, French Foreign Minister Claude Cheysson told a press conference here today. The fissile materials from the reprocessing, however, would be subject to the control of the International Atomic Energy Agency (IAEA) as applicable to other countries, he added.

When asked whether the United States would be a party to the Indo-French agreement, he said, since the proposed agreement would be signed shortly between India and France, "why should they be"? He said his country will be pleased to supply nuclear fuel for the Tarapur plant.

France had been requested to supply low degree of uranium and technique in this field, he noted.

C. Cheysson, who arrived here for one day's visit to India, called on Mrs. Indira Gandhi and talked with India's external minister, P. Narasimha Rao, for two hours. The two sides were satisfied with the expansion of Indo-French cooperation in the economic matters and trade, and expressed the hope for further progress. Cheysson left for home tonight.

CSO: 5100/2240

AUSTRALIA

DEPUTY PM ANTHONY THREATENS U.S. OVER URANIUM BAN

Sydney THE SYDNEY MORNING HERALD in English 1 Jul 82 p 1

[Article by John Short]

[Text] CANBERRA. — The Deputy Prime Minister, Mr Anthony, threatened yesterday to ban American investment — and the use of its technology— in Australia's proposed uranium enrichment industry if the United States limits uranium imports.

Speaking at the National Press Club in Canberra, Mr Anthony said: "Why have US technology and capital to enrich uranium when we can't sell it back into that country?

"Naturally if the United States thinks that they are going to get the advantage of selling their technology here and then not welcome us marketing in their country then I doubt if we would be interested."

He said Australia had made its position clear to the US Vice-President, George Bush, when he visited Australia in April.

The Deputy Prime Minister also:

- Said the Government would maintain preferential interest rate arrangements on bank loans for home-buyers, farmers, and small businessmen — contrary to the recommendations of the Campbell Inquiry into Australia's financial system.
- Cast serious doubts on the Government accepting the Industries Assistance Commission's recommendations to immediately begin phasing down tariffs over 10 years and reduce export incentives as from June 30, 1983.
- Set out Australia's proposals for implementing Mr Fraser's plan to increase international trade by reducing protection.

The Deputy Prime Minister's threat of retaliation against America comes at a time when a special committee of Congress is considering legislation proposed by Senator Domenici, a Republican from the uranium-producing State of New Mexico, which would severely limit uranium imports.

Under the proposal American companies using uranium to generate electricity would be required to buy at last 80 per cent of their uranium in the US — thus restricting overseas uranium to 20 per cent of the American market.

Mr Anthony said Australia was "vigorously opposing" the proposal and that he did not believe it would be adopted.

But yesterday he left no doubt that if the legislation was adopted Australia would take tough retaliatory action.

"I have made numerous representations in the United States and when Vice-President Bush was out here — again when I saw him in Washington (earlier this month) — and I have spoken to various US officials about it.

"If they move in that direction then it will have very serious consequences for Australia's prospects for selling uranium in the United States.

"I think it would naturally have consequences on the US being involved in any enrichment program in Australia."

CSO: 5100/7544

DEBATE OVER NUCLEAR POLICY CONTINUES TO ROCK LABOR PARTY

North-West Cape Issue

Canberra THE AUSTRALIAN in English 30 Jun 82 p 2

[Article by William Pinwill]

[Text] AMID growing confusion, over his recent defence statements, the Leader of the Federal Opposition, Mr Hayden, has reaffirmed that a Labor Government would close the North-West Cape base unless it obtained the right of veto over American nuclear firing orders.

A spokesman for Mr Hayden said yesterday his failure to mention the veto in a speech on Monday did not mean he had abandoned the pledge.

But sources close to the deputy leader and ALP spokesman on foreign affairs, Mr Bowen, said it was their understanding that Mr Hayden had agreed to drop his earlier demand for Australia's "mandatory consent" to nuclear firing orders.

The Opposition spokesman on defence, Mr Gordon Scholes, said the Labor platform on defence and foreign affairs did not include the demand for a North-West Cape veto, and so was not part of Labor policy. But he said the bases were Mr Bowen's responsibility.

Mr Hayden told a disarmament seminar in Sydney on Monday that Labor would renegotiate the agreement covering the joint naval communications station at North-West Cape, "aimed at achieving our requirements".

But he added that a proposal by Mr Bowen to send an Australian representative to Washington to monitor US strategic policy "would serve as an interim measure".

Mr Hayden's spokesman said this was necessary because the agreement was not due for renegotiation before 1988.

"There is no intention to withdraw from what Mr Hayden said at the National Press Club in April last year," the spokesman said.

On that occasion, Mr Hayden said: "We would seek to renegotiate the North-West Cape agreement to provide, first, that Australia's consent is mandatory for all orders to initiate military action which flow from the station . .

"If the US would not accept these reasonable provisions designed to protect our national sovereignity, then we would ask them to wind down the operations of North-West Cape as rapidly as possible."

The US Government has indicated it will not allow Australia to veto messages sent through the station.

The North-West Cape issue is now expected to join nuclear ship visits as a matter of controversy at the ALP National Conference in Canberra next week.

Mr Hayden's reversal of policy to allow visits by nuclear-armed warships has angered the left-wing of the party.

It is now known that the Victorian Premier, Mr Cain, consulted Mr Hayden about his proposed ban on nuclear ships in Victorian ports before the Prime Minister, Mr Fraser, was told of the plan.

ALP colleagues previously believed Mr Hayden had been caught unawares by Mr Cain's proposal. But well-placed sources told *The Australian* that Mr Hayden had not only been told in advance but had indicated he would oppose visits by nuclear-armed ships.

Debate in National Executive

Melbourne THE AGE in English 2 Jul 82 p 3

[Article by Michelle Grattan, chief political correspondent]

[Text] CANBERRA. — Members of the ALP national executive were sharply divided yesterday when they debated the future of the party's uranium policy.

Left-wing members of the executive, including the former South Australian Attorney-General, Mr Duncan, and Mr Hogan (Vic), said that Labor's commitment to a ban on the mining and export of uranium must continue.

But other speakers, especially the leader of the ALP in the Northern Territory, Mr Collins, said this policy was no longer viable.

Mr Collins said there would be high costs in banning mining, including payment of money in lieu of royalties to Aborigines and the cost of restoring the landscape.

The deputy Opposition leader, Mr Bowen, indicated he favored a softer policy, and frontbencher Mr Hawke said that his view, which favored change, was well known.

The Opposition Leader, Mr Hayden, is expected to speak when the debate resumes today. About two hours was spent on uranium yesterday. The executive received a report from a subcommittee which has examined the pros and cons of retaining the present policy of banning mining and export.

The report made no recommendations, but it canvassed the electoral handicaps of the policy, which will be debated at next weeks' national conference.

The committee looked at the economic, financial and social implications of the uranium policy.

After yesterday's meeting, the ALP's national secretary, Mr McMullan, said the conference would consider changing policy, and he thought an accommodation was possible, but he could not predict the outcome.

The Left is confident that it has the numbers to stop a change in policy. But the Left is very concerned and angry at Mr Hayden's interpretation, in an 'Age' interview this week, of the present policy. Mr Hayden said this could allow uranium mining if a Labor Cabinet was satisfied that the conditions laid down had been met.

Mr McMullan said yesterday's debate had been promising, and there would be a lot more discussion between now and the conference.

The executive will today consider the agenda for the national conference.

Patrick White Warning

Sydney THE SYDNEY MORNING HERALD in English 6 Jul 82 p 1

[Article by Paul Kelly]

[Text] CANBERRA. — The Nobel prize-winning novelist Patrick White has warned the Labor Party against ditching leaders to get a better image and has appealed to the party to keep its principles on the nuclear issue.

Mr White wrote to the National ALP president, Mr Wran, on July 2 and his letter was passed about the corridors yesterday when the ALP national conference met in Canberra.

"In World War III Australians cannot hope that time and distance will protect them from advanced nuclear technology," Mr White said.

"If we don't search our conscience in the months to come and realise there is more to life than money, minerals, and missiles, we run the risk of offering ourselves for destruction as well as helping to destroy the world.

"We must remember that the most important issue today is the prevention of nuclear war."

One image from Hiroshima summed up the nuclear situation — the figure "of a naked man reported standing on a dark plain which had been his city, holding his eye in the palm of his hand."

"In the light of this symbol of humankind reduced to disbelieving dispair, let us not succumb to our own blindness" Mr White said.

"Let us not soften to gain votes or appease allies."

"Moral steel could be our most effective armament against political dishonesty at home and the ultimate physical violence which will annihilate the world."

He warned Labor against believing "that by ditching one leader for another we shall appeal to more than the odd trendy swinger, impressed by a public figure's image, the hairdo and the well cut suit rather than basic integrity."

Adoption of Softer Stand

Melbourne THE AGE in English 8 Jul 82 pp 1, 5

[Article by Michelle Grattan, chief political correspondent]

[Text]

CANBERRA. — The ALP's national conference, amid emotional scenes yesterday softened the Party's anti-uranium policy so that a Labor Government could honor existing contracts.

The switch was made after days of intense lobbying. The shadow Attorney-General, Senator Evans, told the conference this manoeuvring had involved some "thuggishness" and threats to MPs' pre-selections

As delegates' names were read out during a division at the end of the debate, spectators jeered those who had voted for change and cheered delegates who had unsuccessfully supported the existing party policy banning the mining and export of uranium. Anti-uranium placards bedecked the back of the conference room at Canberra's Lakeside Hotel.

The new, more moderate policy, which would still prohibit a Labor Government from approving new mines, was carried 53 to 46. It was strongly supported by the Opposition Leader, Mr Hayden, his deputy, Mr Bowen, the spokesman on Minerals and Energy, Mr Keating, and the undeclared challenger for the party leadership, Mr Hawke. But the Victorian Premier, Mr Cain, and the Labor leader in the Senate, Senator Button, voted against it.

The vote was another defeat for the Left, and a victory for Mr Hayden, although he would have preferred the policy to be softer still. Federal frontbencher, Mr Uren, a leader of the Left, said after the vote: "It is a sad day for the progressive forces."

The new policy removed the obligation, imposed by the 1977 conference, on a Labor Government to repudiate contracts which already exist. The policy declares that an incoming Labor Government "is already committed to repudiate all existing commitments". But it adds that in light of the difficulties of repudiation, a Labor Government's "minimum position" would be "to phase out" Australia's uranium industry and allow mines which are producing now (in July 1982) to continue only under strict conditions.

Tragedy

The softer policy was moved by the Victorian party secretary, Mr Bob Hogg, of the Socialist Left. Mr Hogg told the conference that it was a tragedy that the uranium policy was being debated. But it had been impossible to prevent this, and his amendment was designed to head off other proposals which would have been "infinitely worse".

The compromise was drafted only on Tuesday night and the numbers were sewn up over the luncheon adjournment yesterday.

All State delegations were divided on the issue, but all State leaders except Victoria's Mr Cain supported the Hogg amendment, which was seconded by the Northern Territory leader Mr Collins.

Mr Cain later denied that he had bowed to pressure from the Socialist Left to vote the way he did. The policy decided was now the one which had been accepted by the whole party, he said. The decision did not affect his plans to make Victoria a nuclear-free State.

Mr Hayden, supporting the Hogg amendment, told the conference: "Our existing policy on this matter is clearly cut and dried. But the issue itself is not cut and dried." Mr Hayden said he did not interpret the Hogg motion as "an open door approval for mining".

"I regard it as a very tough anti-uranium mining proposition. But it is a sensible proposition because what it is proposing is a phasing out system which we do not have at the moment."

Moral responsibility

Mr Hayden said that although the party had legal advice that it would not be obliged to pay compensation for closing mines, such an action would, in the public view, impose "a moral, political responsibility" to compensate.

He warned that to shut mines overnight could produce a crisis in foreign investors' confidence, generating a balance of payments crisis and a "massive devaluation". "It would bring the Australian economy to a halt overnight. It would really screw down the economy. It would be devastating in its effect. We would almost become a banana republic in the standards of the condition of the economy.

"If we do not put in a transitional arrangement — that is all it is — then we present no choice to the community but the prospect of a Labor Government which will undoubtedly cause a panic and a flight of capital with a balance of payments which is enormously weak, an enormous potential for collapse: in that situation we will not even get to the starting post on election day."

All seven members of the Victorian Centre Unity Group, Mr Hawke's faction, voted for the amendment. The Centre Unity decision to support the amendment, taken only yesterday and by a very narrow vote, was crucial for the success of the mood to soften the policy.

Senator Evans told the conference that the only political risks delegates faced in voting for the amendment came from within the party.

"There has been an unprecedented degree of heaviness, bordering on occasion on thuggishness, in the way threat have been bandied about. An extraordinary degree of pressure has been placed upon those of us, and I am one of them, who face preselection in this party in the very near future.

"Certainly that is true in Victoria. John Button . . . has been faced with some very chill winds indeed in this respect. I have been faced with them. Clyde Holding has been faced with them."

Opposing the Hogg amendment, Federal frontbencher, Mr West, who led the debate for the Left, said: "Bob, it is an irresponsible document. It is not even credible, mate. It endorses the existing policy and then goes on to repudiate that policy. Delegates, do not kid yourselves, it is a pro-mining amendment."

Supporting the Hogg amendment, Mr Hawke said delegates should not delude themselves that there was some socialist principle in the uranium issue. "No other element of the world democratic socialist movement" had this policy, he said.

The "phase out" will ensure that if Labor wins power uranium mining will continue until at least the 1990s under existing contracts.

The policy adopted says that an ALP Government would "give total commitment to preventing any new mines from being developed during our period of office".

It lays down strict conditions which would be applied in Government if existing mines were to continue, and threatens that a Labor Government would apply trade embargos to ensure these conditions were met.

"For example, any contract with the French Government could only be contemplated subject to that Government ceasing all nuclear test programmes in the Pacific," the policy says.

Among the conditions laid down for continuing mines are that:

Miners, producers and users of the products of the nuclear fuel cycle accept responsibility for developing effective waste disposal and safety and health conditions.

- Measures are adopted in the International Atomic Energy Agency and elsewhere to establish new, multi-lateral approaches to a reduction in nuclear proliferation and more effective control of existing nuclear facilities.
- Satisfactory arrangements have been developed for the storage and disposal of the products of uranium mining.
- Arrangements have been established by companies, in co-operation with national health authorities, for health screening and study of employees.
- The treatment, storage or enrichment of nuclear materials in Australia is not permitted — nor is the domestic use of nuclear power.

Text of Party Position

Melbourne THE AGE in English 8 Jul 82 p 16

[Text]

This is the text of the amendment to the ALP's uranium policy.

The motion reads: That the uranium platform be implemented in the light of the following:

1.—The ALP's approach to uranium policy is dominated by its concern that the economic, social, biological, genetic, environmental and technical problems associated with the nuclear industry are unresolved, and that problems associated with the nuclear industry are unresolved, and that uranium is a source material leading to nuclear armaments proliferation, which poses the most serious threat to world peace yet experienced, and to Australian sovereignty.

2.—We have remained steadfast in our opposition to the growing propensity for reliance upon the nuclear fuel cycle as a source of energy, and for other commercial and military applications.

3.—The development of the nuclear fuel cycle has delayed the development and application of passive energy technologists more suitable to our fragile global environment.

4.—The uncritical support of nuclear technologies by Governments world-wide encouraged the nuclear industry to develop before the fundamental questions of safety, disposal techniques, effective regulatory and safety systems were tackled, and which still remain unresolved.

5. The acceptance of nuclear power as an energy alternative by developing countries has not only presented these countries and the world with a substantial safety and surveillance problem, but has provided many with the option of becoming nuclear weapons states, adding to the dangers of increased armament proliferation.

Distressing

6. Labor believes the development of a nuclear-weapons capability from civil nuclear programmes is the most distressing feature of nuclear power, and one which requires the most urgent and earnest international attention.

7. Australia is not a producer of nuclear power but is involved in the international nuclear fuel cycle as a supplier of uranium.

8. Despite widespread concern in the community, and the opposition of the Australian Labor Party and the trade union movement, commitments have been made by previous Governments to certain corporations operating uranium mines in Australia and to the Governments of customer countries, to maintain Australia as a uranium exporter.

9. We recognise on becoming Government:

A. We will inherit an existing position of Australia under the Fraser Government of having made treaties and authorised contracts of supply of uranium to a growing number of countries with little effort to impose controls and conditions on supply.

B. An incoming ALP Government is already committed to repudiate all existing commitments. In adopting our repudiation commitment an ALP Government has neither a moral, legal, or political obligation to compensation to the industry as such.

C. Understanding the difficulties which could be encountered in the implementation of that commitment, our minimum position would be a total unequivocal commitent to phase out Australia's involvement in the uranium industry, and that certain conditions as outlined will and must be applied to those mines existing in producton as of July 1982.

D. As an ALP Government we give total commitment to preventing any new mines from being developed during our period of office.

10. Accordingly an Australian Labor Party Government will:

A. Make a total commitment to exerting all possible influences on the development of creating effective international arrangements covering nuclear non-proliferation treaties, waste disposal, arms control and nuclear disarmament.

B. Review bilateral safeguard agreements governing supply under these contractual arrangements and, if necessary, renegotiate these agreements to impose conditions relating to the nuclear practices of the customer country (e.g. the cessation of French atomic testing in the Pacific area).

C. Consider applications for the export of uranium mined incidentally to the mining of other minerals on a case-by-case basis, and on the criteria of whether in the opinion of a Labor Government the mining of such minerals is in the national interest.

D. Allow no new uranium mine developments to commence or come on stream while the Government of Australia.

11. In Government, if the only recourse is to implement a policy of phasing out the industry as of July 1982, the following conditions will be applied:

A. Miners, producers and users of the products of the nuclear fuel cycle accept responsibility for developing: effective waste disposal mechanisms, satisfactory safety and occupational health conditions, proposals and funding for the decommissioning of nuclear plants and also provide financial assistance for the development of safe alternative energy sources.

B. Measures are adopted in the International Atomic Energy Agency and elsewhere, not only to improve the technical efficiency of existing safeguard systems, but also to establish new and multilateral approaches to a reduction in nuclear proliferation and to more effective control of existing nuclear facilities.

Arrangements

C. Satisfactory arrangements have been developed for the storage or disposal of the products of uranium mining, low level waste such as equipment or material contaminated by radioactivity, spent fuel, plutonium and depleted uranium as products of reprocessing and high level waste separately reprocessing.

D. Arrangements have been established by mining companies, in co-operation with national health authorities, for health screening and study of employees, both while employed and for a period considered by medical authorities as being necessary to detect the incidence of disease related to exposure to radioactivity.

E. Not permit the treatment, storage, or enrichment of nuclear materials in Australia nor domestic use of nuclear power. While opposed to the establishment of domestic storage and treatment systems, Labor will support the development of safe long-term nuclear waste disposal technology for application to existing waste problems.

12. Consistent with clauses 9B and 9C, an Australian Labor Government will adopt the process of phasing out our involvement in uranium mining, and certain conditions will be imposed upon the producers in accordance with this policy. We will utilise our right to apply trade embargoes to ensure these conditions are met.

For example, any contract with the French Government could only be contemplated subject to that Government ceasing all nuclear testing programmes in the Pacific.

For example, any contract with the Japanese could only be contemplated subject to them withdrawing from their intention to dump waste material in the Pacific.

For example, any contract with the Finns would be subject to us being satisfied beyond all doubt that the supply of uranium was not being deflected into the nuclear fuel cycle and nuclear arms programme of the USSR.

For example, any contract with Great Britain would be subject to us being satisfied beyond all doubt that the supply or uranium was not being used to assist in developing nuclear armaments.

For example, any contract with the West Germans would be subject to them ceasing the supply of technology and equipment to countries such as the Argentine, which is leading to the establishment of yet another potentially nuclear armed country.

Any such conditions will apply to purchasing countries other and above existing international safeguard agreements being agreed to and observed.

The principles inherent above which apply to specific markets will be applied in relation to contracts to any other countries, arising out of the production of current mines, within which similar circumstances arise.

13. Labor is committed to reversing the direction of nuclear developments worldwide. As part of this commitment, a Labor Government will undertake appropriate research and provide assistance to the energy-impoverished nations of the world to find energy solutions which are more suitable to their decentralised populations and which are a real alternative to reliance upon large blocks of expensive centralised nuclear generation with extensive reticulation grids.

14. Labor will take steps in international forums such as the International Energy Agency to promote a fair distribution of available energy resources so that the rich nations are precluded from placing inordinate demands upon the world's scarce and finite fuels.

15. Nations must also be convinced that their interests are best served persisting with energy systems which utilise their indigenous fuels, and decrease their dependence upon the international oil trade, trans-national oil companies and the merchants of nuclear power.

16. As part of its comprehensive approach to uranium policy and its concern for the gravity of the international outlook for peace and security, Labor will monitor the nuclear activities of other countries and their propensity to develop weapons capabilities. In tandem with its monitoring programme and to reduce the prospect of a nuclear war, it will indefatigably pursue a policy of international arms control, and disarmament.

17. If in implementing this policy opportunities for employment are effected on a regional basis, then provision will be made for adjustment assistance, compensation and alternative employment opportunities to those workers, and the provision of financial assistance to an alternative means of economic development for those Aboriginal communities adversely affected will be guaranteed.

18. On a regional basis, the provision of special assistance to those local economies adversely affected by the implementation of the policy will be given to facilitate the implementation of alternative policies for economic development.

19. In adopting the view that the onus and responsibility to meet the conditions as outlined rightly belongs to the miners, producers, and developers, we determine that an Australian Labor Party Government will have neither a moral, legal, or political obligation to compensation to the industry as such. The responsibility is heirs to meet the above necessary and reasonable conditions. It is not the responsibility of Governemnt.

20. Finally, no revision of this policy with the view of allowing the industry to develop further will be undertaken by the Australian Labor Party until and unless all of our unresolved concerns related to the industry are satisfactorily resolved and agreed to by the ALP national conference.

Party Leaders' Debate

Sydney THE SYDNEY MORNING HERALD in English 8 Jul 82 pp 1, 11

[Article by Paul Kelly]

[Excerpts] CANBERRA--In the face of earnings that the uranium issue would destroy an ALP Government, the Labor Party reversed policy yesterday and paved the way for current uranium export contracts running until 1996 to be honoured.

The conference decided to reaffirm the existing ALP uranium policy which involves repudiation of uranium sales contracts finalised under the period of the Fraser Government. It then accepted the Hogg amendment establishing a set of condutions under which the policy would be implemented.

The effect of these conditions is to give a future ALP Government the option of allowing the existing contracts--which are underpinned by investments worth $1,000 million--to be fulfilled. That is, in the words of Mr Hayden, it allows a transition period in which a Labor Government could phase out the uranium industry.

The Hogg amendment was supported by delegates from the Left, but got its majority backing from the Right and Centre.

The main opposition came from key left-wing delegates, led by Mr Uren, Mr West and Mr Ferguson from NSW, and Mr Duncan from South Asutralia.

Mr West, in an emotional appeal, said: "Bob, it is an irresponsible document, it is not even credible, mate.

"It is a pro-mining amendment. It is pro-nuclear. You know that the contracts will be filled.

"In 20,000 years maybe the name of the great Australian Labor Party will be forgotten but this stuff will still be around. Don't you see the responsibility you have to mankind?"

Mr Uren said: "I believe this document is a tragedy. I believe politically it is a stupid document. I believe that it will bring a lot of discredit to the movement, and frankly I have told Bob himself that this document is a promining document."

Mr Richardson said that 21 international banks had financed Australia's uranium mines. Any repudiation of those investments would mean an economic upheaval for Australia.

"Do we think they (the banks) will take it lying down?" Mr Richardson asked.

"The answer, of course, is no. Investment into Australia will just dry up. Our capital inflow will stop and we will be faced with a balance of payments crisis."

Mr Hayden warned that implementation of the current policy "would bring the Australian economy to a halt overnight."

It would force a dry-up of capital inflow and the only recourse would be "a massive devaluation--an absolutely massive devaluation."

Mr Hayden said: "We would almost become a banana republic in the standards of the condition of the economy.

"However, in my assessment you will not even get into that position because before election day, the people who have got money here . . . are going to start hauling their money out."

Mr Hayden said that under existing policy, a Labor Government would pay $30-$40 million for environmental rehabilitation. It would face another $20 million for displaced employees.

It would have a "moral and political responsibility" to compensate the industry for its $1,000 million existing investment.

The uranium result was a major defeat for the Left wing and its NSW leader, Mr Uren, who has spear-headed the anti-uranium movement in the Labor Party for several years.

After the debate, Mr Uren said: "It's not the end, but the beginning of the struggle."

Mr Hayden welcomed the policy change along with Mr Keating. The Labor leader initiated moves to change the policy several weeks ago when he set up a special subcommittee of the national executive to study the matter. He was strongly supported by Mr Keating and Mr Richardson in these efforts which culminated yesterday.

CSO: 5100/7545

BIGGEST URANIUM PROJECT, JABILUKA MINE, GIVEN CLEARANCE

Aboriginal, Land Council OK's

Melbourne THE AGE in English 30 Jun 82 p 6

[Text]

DARWIN, 29 June. — Traditional Aboriginal owners and the Northern Land Council have given Pancontinental Mining the go-ahead to proceed with Australia's biggest uranium development, the $600 million Jabiluka mine in the Northern Territory.

The traditional owners reached agreement with senior mining company representatives at the Pancontinental Mining camp at Djarr Djarr in the Kakadu National Park yesterday afternoon.

The agreement followed a week of talks between traditional owners and negotiating teams from the Northern Land Council and Pancontinental at the site, about 250 kilometres east of Darwin.

The full Northern Land Council ratified the agreement after a 2½-hour meeting with the traditional owners at the site. The final agreement will be formally drawn up and signed by all parties at a later date.

The agreement was announced in a short statement issued by the chairman of the Northern Land Council, Mr Gerry Blitner, immediately after the meeting of the full council.

Mr Blitner replied to recent suggestions by the Federal Opposition, particularly by the spokeswoman on Aboriginal Affairs, Senator Ryan, that mining interests had placed pressure on the traditional owners to allow the development.

"We are sorry to see that the shadow Ministers for Aboriginal Affairs believes the traditional owners have been under pressure," Mr Blitner said. "But from our experience, both first hand and in the field, and from our talks with the traditional owners today, neither we, nor they, can accept her statements.

Senator Ryan said yesterday that there was no economic or social justification for the development of Jabiluka mine at this time. "It is ironic that at a time when intense pressure from mining interest is being put on traditional owners to agree to Jabiluka proceeding, yellow cake prices have fallen to a new low," she said.

The agreement has to go before the Federal Minister for Aboriginal Affairs, Mr Wilson, for approval under the terms of the Federal Land Rights Act, but this is seen as a formality. The Government has already given the Jabiluka joint venturers, Pancontinental and the American-owned Getty Oil Development Company Limited, permission to seek overseas markets for the uranium.

Jabiluka is the richest of the four identified deposits in the Territory uranium province, with an estimated lode of 200,000 tonnes of uranium and about 12,000 kilograms of gold.

Pancontinental's chairman, Mr Tony Grey, has estimated that on present prices the total value is more than $18,000 million. In full production, the mine, which will be the Territory's first underground uranium mine is ex-

pected to earn $600 million in exports each year.

The details of the financial, environmental and employment conditions of the agreement have yet to be released, but copies of the confidential draft agreement have been leaked to the media.

The joint venturers agreed to pay the traditional owners $10 million in addition to royalty payments.

The agreement sets a royalty payment of 4.5 per cent plus a payment of $500,000 a year for the first 10 years, with a royalty of 5 per cent after the initial 10-year production phase.

1984 Start-Up Prediction

Sydney THE SYDNEY MORNING HERALD in English 1 Jul 82 p 21

[Text] ADELAIDE. — Production from the Jabiluka uranium project could start as soon as 1984, the Northern Territory Minister for Mines, Mr Ian Tuxworth, said yesterday.

Mr Tuxworth said the signing yesterday of a final agreement between the developer of the $600 million project, Pancontinental Mining, the Northern Land Council and traditional owners of the project area, located about 250 kilometres east of Darwin, would enable production to begin in 1984 or 1985.

Mr Tuxworth also said Australia would miss a great opportunity if it did not develop its uranium mines, including the Roxby Downs project in South Australia, as soon as possible.

"In the short term, if we beat you into the market it will make the future for Roxby a little difficult," he said.

"But looking to the long term, and I'm talking about the post-1990s to 2010, I think it's absolutely essential that your Roxby Downs project goes as fast as possible."

Mr Tuxworth said Australia had an ideal opportunity to become a world supplier if it moved quickly to establish its credentials as a dependable uranium producer.

"But to do that, your project here at Roxby and all our four or five mines in the territory must come out of the starting blocks in the next year or two," he said.

CSO: 5100/7544

FRASER PROCEEDING WITH LAWS PERMITTING NUCLEAR-SHIP STOPS

Canberra THE WEEKEND AUSTRALIAN in English 3-4 Jul 82 p 1

[Article by Russell Schneider]

[Text] THE Federal Government will try to use Labor's modified stand on the nuclear ships issue to force a confrontation with the Senate and trigger a double dissolution election, when Parliament resumes.

Government strategists plan to seize on Labor's continued opposition to the use of Australian port facilities by nuclear-armed or nuclear-powered ships and turn it into an issue by legislating to allow the berthings.

They believe this will force the ALP caucus either to veto the legislation, bringing about an election fought on defence issues, or to renege on decisions of its own national conference.

Plans on the legislative manoeuvres to force a double dissolution have hardened in the past few days as Government tacticians look at the likely developments at next week's ALP conference.

The Government plans to introduce a bill to "allow the home-porting of allied ships" when Parliament resumes on August 17 for the Budget session.

Because some of these "allied ships" — from the United States or United Kingdom — will be either nuclear-powered or nuclear-armed, the legislation would be in conflict with the ALP policy expected to be set at the conference.

The policy, now endorsed by the Leader of the Opposition, Mr Hayden, his deputy, Mr Bowen, and other senior ALP officials, permits visits by nuclear ships but provides that "Labor opposes the use of Australian facilities for the permanent basing of foreign naval vessels in time of peace".

Liberal Party strategists have been analysing ways they can manipulate the wording, which seems certain to be approved by the conference.

They believe if the legislation allows allied vessels to have home bases in Australia, Labor senators will be forced to veto the legislation when it reaches the Senate.

This would allow the Prime Minister, Mr Fraser, to go to an election on the grounds that Labor would destroy the US alliance.

America has no plans now to base its ships in Australia. But several years ago Mr Fraser offered it a base for an Indian Ocean fleet or flotilla at the new RAN station at HMAS Stirling, near Perth.

When it introduces the legislation, the Government will argue that the question of allied rights to berth ships cannot await the outbreak of a war.

It will say the right of allies to base their warships in Australia must be spelt out in legislation rather than be subject to political delays if fighting begins.

The government moves were triggered initially by the Victorian Premier, Mr Cain, who wanted to declare his State a "nuclear-free zone" and tried to ban the entry of nuclear ships to Victorian ports.

Although Mr Hayden supported Mr Cain at first, he later adopted a Labor Defence and Foreign Affairs Committee proposal that only the "permanent basing" of foreign naval ships should be opposed.

Although the issue seems technical it is of crucial significance to the tactics of the coming Budget session when Mr Fraser will be doing his best to exploit the decisions of the ALP conference.

He is understood to be anxious to provoke circumstances in which Labor and Australian Democrat senators will combine to veto legislation on which he can argue the ANZUS alliance depends.

This would ensure any snap election is fought on defence issues.

Immediately Mr Cain declared Labor would oppose visits by nuclear ships the Government decided it would legislate to declare Commonwealth powers over foreign treaties.

CSO: 5100/7544

EXPERT PREDICTS GOOD PROSPECTS FOR AUSTRALIAN URANIUM

Brisbane THE COURIER-MAIL in English 3 Jul 82 p 27

[Text]

CANBERRA. — Australian uranium production had increased in recent years while numerous producers, especially in the United States, had cut back or stopped production, according to Mr Gordon Battey, head of the Bureau of Minerals Research's uranium assessment group.

Mr Battey said sluggish growth of nuclear power in recent years, an oversupply and falling real prices, had caused the halt.

He told the Petroleum and Minerals Review conference in Canberra that Australia and Canada were in a good position to exploit growing demand for uranium in the late 1980s and 1990s.

He said spending on uranium exploration in Australia had shown a steady increase in recent years, in contrast to most other countries.

This was partly due to the high success rate in Australia and the relatively low unit cost of discovery.

There was concern that recent developments in the market could cause investment in exploration and development now to fall short of what would be needed to ensure enough uranium to meet further requirements.

But in Australia, production had increased in recent years at Nabarlek in June 1980, and Ranger in August 1981.

However, production at the Mary Kathleen mine was expected to stop in December this year because the remaining resources would be uneconomic at current prices.

Australia was now estimated to have 294,000 tonnes of uranium recoverable at less than US$66 a kilogram.

Current world resources were considered to be adequate to meet any likely level of demand for the next 20 years.

A coal commodity specialist told the conference the expectations of the Australian industry had suffered in recent months because of economic factors, including less demand for coal by the major importing countries.

Mr Mike Huleatt said new techniques such as fluidised bed combustion would allow the use, as a fuel, of much material which was now rejected.

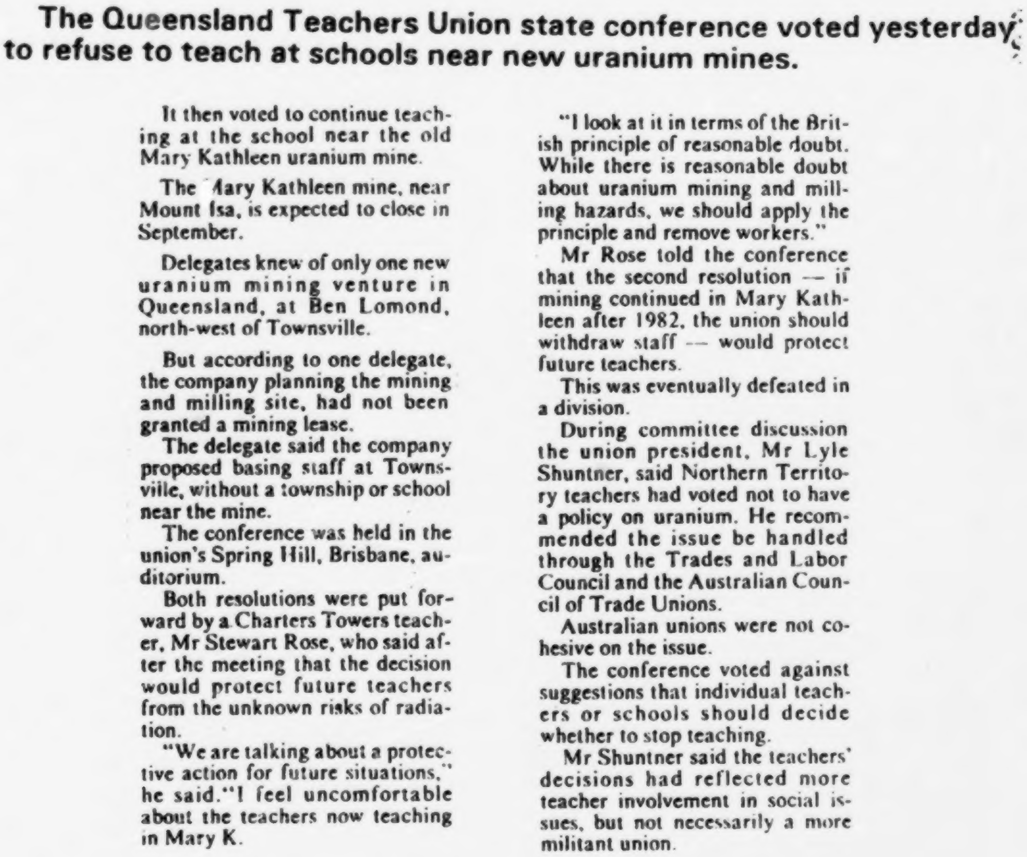
He said that because much of the black coal mined was subsequently washed, there was a loss of material which had amounted to about 18 percent in recent years.

CSO: 5100/7544

TEACHERS DRAW LINE AT WORKING NEAR URANIUM MINES

Brisbane THE COURIER-MAIL in English 1 Jul 82 p 14

[Text]



The Queensland Teachers Union state conference voted yesterday to refuse to teach at schools near new uranium mines.

It then voted to continue teaching at the school near the old Mary Kathleen uranium mine.

The Mary Kathleen mine, near Mount Isa, is expected to close in September.

Delegates knew of only one new uranium mining venture in Queensland, at Ben Lomond, north-west of Townsville.

But according to one delegate, the company planning the mining and milling site, had not been granted a mining lease.

The delegate said the company proposed basing staff at Townsville, without a township or school near the mine.

The conference was held in the union's Spring Hill, Brisbane, auditorium.

Both resolutions were put forward by a Charters Towers teacher, Mr Stewart Rose, who said after the meeting that the decision would protect future teachers from the unknown risks of radiation.

"We are talking about a protective action for future situations," he said. "I feel uncomfortable about the teachers now teaching in Mary K.

"I look at it in terms of the British principle of reasonable doubt. While there is reasonable doubt about uranium mining and milling hazards, we should apply the principle and remove workers."

Mr Rose told the conference that the second resolution — if mining continued in Mary Kathleen after 1982, the union should withdraw staff — would protect future teachers.

This was eventually defeated in a division.

During committee discussion the union president, Mr Lyle Shuntner, said Northern Territory teachers had voted not to have a policy on uranium. He recommended the issue be handled through the Trades and Labor Council and the Australian Council of Trade Unions.

Australian unions were not cohesive on the issue.

The conference voted against suggestions that individual teachers or schools should decide whether to stop teaching.

Mr Shuntner said the teachers' decisions had reflected more teacher involvement in social issues, but not necessarily a more militant union.

CSO: 5100/7544

SOUTH AUSTRALIA LAYS GROUNDWORK FOR URANIUM ENRICHMENT

Canberra THE AUSTRALIAN in English 7 Jul 82 p 3

[Article by Peter Blunden]

[Text] SOUTH Australia is moving closer to establishing the nation's first uranium-enrichment industry.

It has prepared the groundwork for an indenture bill enabling a conversion plant to be built.

This is despite the fact that such a document cannot be drawn up until a feasibility study which began 13 months ago is finished.

The Premier, Mr Tonkin, said yesterday the bill might be introduced before the next State election, due within eight months.

It would allow the establishment of a $100-million uranium-conversion plant, regarded as a stepping stone to the enrichment process.

The Government would hold further talks this month with a European consortium, Urenco Centec, over the setting up of an enrichment plant worth about $1000 million.

Moves to set up an enrichment industry would give Mr Tonkin an election issue. The ALP and the Australian Democrats oppose such developments.

Only last month, a protracted row over the $1000-million Roxby Downs uranium, copper and gold venture ended with the Opposition narrowly failing to veto the project.

Competition between Queensland, the Northern Territory, Western Australia and South Australia to establish a uranium-enrichment industry is intense.

However, the latest moves by South Australia indicate it might be closest to achieving it.

An agreement is being prepared with a group of companies, the Uranium Conversion Joint Venture, even though a spokesman for the group said no commitment had been made.

The companies in the group are Broken Hill Associated Smelters Pty Ltd, British Nuclear Fuels and Roxby Management Services Pty Ltd.

Mr Tonkin said yesterday the bill's introduction would depend on the outcome of the feasibility study.

"We are not dealing with any exact wording at present, but the contents of an indenture are being considered," he said.

"It is obvious the infrastructre which the Government would have to provide must come into the feasibility considerations.

"It makes good sense to have an enrichment plant to begin operations in about 1990, which is around the time Roxby Downs goes into full production," Mr Tonkin said.

A uranium-conversion plant would convert the basic uranium oxide to uranium hexafluoride, the raw material required for the production of enriched uranium used in most nuclear reactors.

CSO: 5100/7544

BRIEFS

PEACEFUL PURPOSES FOR ATOMIC ENERGY--Defense Minister Venkataraman has reiterated India's policy of using atomic energy for peaceful purposes. He was speaking at the silver jubilee celebrations of a training school of the Bhabha atomic research center in Bombay. Describing India as one of the largest scientific manpower in the world, Venkataraman said our scientists should keep themselves abreast of the latest developments in the fields of atomic energy, space communication and ocean technology. It is only then that they would be able to utilize modern technology to find solutions to the indigenous problems of development, Venkataraman added. [Text] [BK020709 Delhi Domestic Service in English 0240 GMT 2 Aug 82]

FRENCH MINISTER'S VISIT--French Foreign Minister Claude Cheysson, now in the capital on a day's visit, has said his country is prepared to supply nuclear fuel for the Tarapur plant under the same provisions as agreed upon with the United States. Speaking to newsmen at Delhi airport on arrival last night, he said the recent high level contacts between Indian and French leaders would be fruitful in identifying areas of collaboration between the two countries. Cheysson will call on Prime Minister Mrs Gandhi and meet the External Affairs Minister Narasimha Rao. Earlier, he was received at the airport by Additional Secretary in External Affairs Ministry J.S. Teja and French Ambassador to India Andre Ross. Vice Foreign Minister of Cuba Torras has also arrived in New Delhi on a 2-day visit. [Text] [BK080903 Delhi Domestic Service in English 0240 GMT 8 Aug 82]

CSO: 5100/2240

PEACEFUL PURPOSE OF NUCLEAR PROGRAM ASSERTED

GF150540 Islamabad THE MUSLIM in English 2 Aug 82 p 2

[Editorial: "Atom for Peace"]

[Text] Addressing the seventh "international summer college on physics and contemporary needs," President Zia has said that Pakistan's nuclear programme was geared to solve the country's acute energy problem and use the technology for the development of Pakistan's sagging economy. He has said time and again in the past that Pakistan was not endeavouring to make nuclear weapons, not even to make an explosion preparatory to the making of an atomic bomb. And yet, unfriendly countries have long been conducting a campaign of vilification and maliciously talking of our elementary efforts as a preamble to the production of an 'Islamic bomb.' The propaganda was first started by the London-based weekly, EIGHT DAYS, two years ago and has since been sedulously played up by hostile elements in other countries. In the unending efforts to malign Islamabad, even the fact that our nuclear facility is strictly in conformity with safeguards precribed by the International Atomic Energy Commission is also conveniently forgotten. It is not this country's desire to steal into the nuclear club as some states, which have persistently refused to sign the non-proliferation treaty, have already done. It may be recalled that Pakistan has always been insisting on the Indian Ocean being declared a nuclear-free zone. In view of all this, and Islamabad's commitment to peace, it is outright calumny that other should continue to call into question the why and wherefore of this country's elementary efforts to acquire some measure of nuclear technology for the avowed purpose of augmenting its slender sources of energy.

If Islamabad has been overly cautious to keep peeping toms away from our nuclear facilities, it is because of the fear that these may be knocked out of sheer malice if not out of any genuine apprehension that a nuclear bomb may be in the process of making. After the recent criminal attack on Iraq's nuclear reactor by Israel, which has in the passing also mentioned Karachi it would be little short of callous neglect if this country were to throw caution to the winds. Pakistan neither possesses the high technology to produce nuclear weapons nor has any desire to make the dreaded bomb and invite devastating attacks from manifestly hostile forces. President Zia's umpteenth assurance on Saturday that this country's nuclear facility is meant exclusively for peaceful purposes, without any sinister motive behind it, should help to ally fears, if any, lurking in some quarters.

CSO: 5100/5692

CONSTRUCTION OF 4TH NUCLEAR POWER PLANT DELAYED

OW030353 Taipei International Service in English 0100 GMT 31 Jul 82

[Today's commentary]

[Text] Use of energy is down all over the world. This is a matter of both price and recession. The developing countries find they cannot afford so much expensive energy. They also must get along with fewer products made from petroleum.

The Republic of China is delaying plans to build its fourth nuclear energy plant and abandoning proposals to construct two more. At the same time, the recent heat wave has brought a record consumption of electricity. People in Taiwan no longer sweat, they turn on their air conditioners. Among what used to be regarded as luxuries, the fan came first, the refrigerator second, the TV third, the washing machine fourth and the air conditioner fifth, or something like that. There is an awareness in Taiwan that the oil glut is not going to last so long, nor is the price of oil stuck at 34 U.S. dollars a barrel forever. Economic recovery is inevitable. Even if it is very slow, more energy will be required. That will mean further increases in the price of oil.

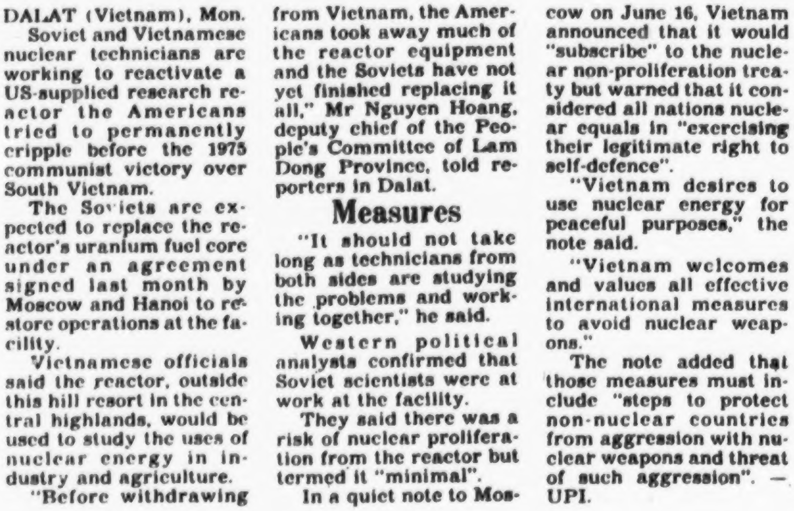
The energy problem has been put on the shelf without any real attempt to seek a resolution. The day of reckoning is coming sooner or later. The supply of oil is not inexhaustable and tends to be in the hands of a relatively few countries.

CSO: 5100/2240

SOVIETS, VIETNAMESE REPAIRING NUCLEAR REACTOR

Kuala Lumpur NEW STRAITS TIMES in English 20 Jul 82 p 14

[Text]



DALAT (Vietnam), Mon. Soviet and Vietnamese nuclear technicians are working to reactivate a US-supplied research reactor the Americans tried to permanently cripple before the 1975 communist victory over South Vietnam.

The Soviets are expected to replace the reactor's uranium fuel core under an agreement signed last month by Moscow and Hanoi to restore operations at the facility.

Vietnamese officials said the reactor, outside this hill resort in the central highlands, would be used to study the uses of nuclear energy in industry and agriculture.

"Before withdrawing from Vietnam, the Americans took away much of the reactor equipment and the Soviets have not yet finished replacing it all," Mr Nguyen Hoang, deputy chief of the People's Committee of Lam Dong Province, told reporters in Dalat.

Measures

"It should not take long as technicians from both sides are studying the problems and working together," he said.

Western political analysts confirmed that Soviet scientists were at work at the facility.

They said there was a risk of nuclear proliferation from the reactor but termed it "minimal".

In a quiet note to Moscow on June 16, Vietnam announced that it would "subscribe" to the nuclear non-proliferation treaty but warned that it considered all nations nuclear equals in "exercising their legitimate right to self-defence".

"Vietnam desires to use nuclear energy for peaceful purposes," the note said.

"Vietnam welcomes and values all effective international measures to avoid nuclear weapons."

The note added that those measures must include "steps to protect non-nuclear countries from aggression with nuclear weapons and threat of such aggression". — UPI.

CSO: 5100/8107

FORMER CNEA OFFICIAL FORESEES CHANGES IN NUCLEAR PLAN

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 25 Jul 82 p 9

[Interview with atomic scientist Jorge Sabato, by Hugo Martinez, in Buenos Aires; date not specified]

[Text] O ESTADO: Is this country building a nuclear submarine?

Sabato: Argentina is equipped to build it, and CNEA [National Atomic Energy Commission] is making the feasibility studies, which will be ready within a year. This is no secret, a strange situation in a country like this, where everything, even the food rations of the military, is a secret. Rear Adm Carlos Castro Madero admitted this. The process was accelerated immediately after the incidents which took place in the Malvinas. From a technical standpoint, there is no problem in implementing the study, and a stringent effort will be carried out.

My status as a citizen, and in particular my responsibility as a citizen, prompts me to favor the idea of subjecting scientific facts to democratic control. I think that the study should be completed and that the decision on the construction of the nuclear submarine should be immediately subjected to an extensive national discussion. It should certainly never be built by a de facto military government. There is no country which has built a single atomic submarine. When the minority advocating armament finds the means for building a submarine, it ends up deciding to build many.

[Question] Do you mean that you would subject the question of the atomic submarine to national discussion?

[Answer] You understood me only partially. My real position is that all policy on armament and all military decisions which involve the citizens should have the participation of the public, through the constitutional institutions.

It is true that, up until the present, from what I know and from what the head of CNEA, Rear Adm Carlos Castro Madero, has said, Argentina did not manufacture the atomic bomb. I don't know whether any nuclear weapon is being manufactured at Campo de Mayo(the largest military quarters in the country), but I have no reason to doubt the statements of the rear admiral. Argentina did not sign the treaties on non-proliferation of nuclear arms; and hence there is only the commitment of its government expressed through CNEA. The more that commitment is reaffirmed, the clearer the Argentine position will be.

To develop and master nuclear energy for peaceful purposes is the best thing that we Argentines can do. In my opinion, we should be opposed to war and the development of the weapons industry, not only for moral reasons, but also because we must not succumb to the nonsense of staring an arms race with our neighbors in South America, or with any other country.

[Question] On what should the strength of a nation be based?

[Answer] It should be founded upon its combined values, but not upon nuclear weapons. To build an atomic bomb is the final rung on the ladder before reaching the final destruction of a country. To waste efforts, skills and resources for that purpose is harmful, and would serve only to satisfy the ego, leading us to be content afterwards with the illusion that we are powerful because we have the capacity to destroy other countries, eliminating them from the face of the earth.

[Question] Is the atomic bomb one of the accesses for rising to the category of a developed nation and a nuclear power?

[Answer] That is a widespread mistake. India has had, from the outset, a military atomic plan based on the deep disappointments and the complex about its colonial status. Its politicians and scientists said: "Let us manufacture the bomb, so that we may be equal," thinking of the one which had dominated it for several centuries. And they produced the bomb. But that capacity did not solve any of that vast country's basic problems: hunger, sanitation, illiteracy. It is a very poor country, with technological islands surrounded by starving cows and people. There is an "atomic ego" which is the main reason that the great powers have become involved in an irrational arms war. The countries which gain access to nuclear technology, although they are underdeveloped, such as India or Argentina, adopt the behavior of the powers. In this race, the capacity for slaughter and destruction is a senseless capacity.

I emphasize that this insane race is not associated with defense, except marginally. The Soviet Union and the United States have a killing capacity that exceeds the requirements of defense or survival. The Soviet arsenals have sufficient weapons to destroy their targets in the United States (the cities with over 100,000 inhabitants) 118 times over. The Americans, in turn, have that capacity 145 times over. It does not appear to me that, in order to kill someone, it is necessary to kill him so many times. When, in the case of a common crime, that of homicide, the killer deals several blows, his crime is punished with stiffer penalties than a common murderer would receive. I wonder what name, what category or what adjective we should give to those responsible for the destruction, more than 100 times over, of Leningrad and its museums, or of New York and its wealth.

It is, moreover, necessary to expose the existence of an arithmetical fallacy concerning the number of missiles required to annihilate a city or raze a country. That number is far lower than the number of missiles existing in the Soviet and American arsenals. This fallacy lies in the fact that, to destroy a city with an amount of weapons five times larger than necessary to accomplish this, or three times larger, amounts to the same thing. The difference in the number of missiles in the possession of one nation and another does not mean less power, after the destruction limit has been exceeded.

That stubborn tendency toward wanting to destroy what has already been destroyed shows the extent of the senselessness that has been reached. It is more beneficial to remain dissociated from that armament-oriented policy to which we have been led by the great powers, dominated by an erroneous concept of the policy.

They act as if nuclear weapons were nothing more than conventional weapons of a different size, without realizing that the war waged with those weapons is different not only in the quantity of effects, but also in the quality thereof. With their use, human beings living in the present and the future die. If Moscow or New York were razed with conventional weapons they could be rebuilt on the same site later. But with the use of nuclear weapons, the radioactivity eliminates all possibilities of recovering the affected area. This did not happen in Nagasaki, because the bomb that was dropped was of small power, compared with the present ones.

All that irrationality is due to the self-interest of the military-industrial complex existing in the United States and the Soviet Union. It should be remembered that, at the conclusion of his last term, President Eisenhower denounced the interests and the pressure which that sector was bringing to bear on the American government. No one has made that denunciation in the Soviet Union, but the military-industrial complex exists there as well, and operates with the same goals and the same irrationality. The militarist ideology is not confined to the capitalist countries, and exists in the socialist bloc countries also, even though they have a different socioeconomic, political and legal structure.

[Question] How would the Marxists justify the existence of this militarist ideology, based on a social, political and legal structure which is different from that existing in the Western countries?

[Answer] The irrationality which the Marxists denounce in the capitalist system stems, in their view, from the way in which the ownership of the goods from production is structured, and its effect on the market. However, the irrationality is associated with certain aspects of the individual; and, in the realm of weapons, it is associated in some instances with the need for profit and, in others, with the goal of achieving greater security.

In the Soviet Union there are two societies. One is that perceived when walking along its streets, and the other (which is essentially military) operates according to its own rules, and is remarkably closed. It belongs to the industrial-military enclave, and is based on defense objectives controlled by its own interests.

[Question] Confronted with changeable situations in the international area, do you think that a nuclear arms race could arise in South America?

[Answer] At the present time, Argentina and Brazil are the leading exponents of nuclear development, and hence the only countries with a capacity to trigger such a race. However, up until now, both countries have been acting cautiously, and have even initiated close cooperation in the nuclear field, for peaceful purposes. Argentina will supply materials for the fuel in the Brazilian powerplants, while Brazil will build components for the Atucha powerplant. Those are only two aspects which attest to an intelligent cooperation, and I think that they give reason for believing that neither of the two countries will succumb to the ridiculous temptation of launching into a nuclear race for military purposes.

The rivalry in the nuclear area for peaceful purposes can and should exist, and it would even be feasible to foster it. That rivalry should stimulate Argentina and Brazil to become better in the field of fuels, and to improve with regard to components. This seems legitimate to me, and I believe that the countries should do it.

[Question] Could not armament-orientation be an impetus for economic growth?

[Answer] This has already occurred in some instances. Japan became radically transformed after the Meiji Revolution, when militarism predominated, strengthened by the victory won over Russia in 1905. But that same ideology prompted the Japanese to start a war with China and, later, to participate in World War II, which they lost overwhelmingly, paying a high price for this.

It was at this time that the Japanese society as a whole realized that the evil lay in militarism. The doors of militarism were closed through the creation of an open, democratic, pluralistic system. On those foundations, Japan created and developed a neocapitalist system, aware of the importance of protectionism and foreign trade, with a fair distribution of income, bearing in mind its own stability.

Throughout its 20th century history, Japan has been an example of how militarism, and its associate, armamentism, can generate growth, but it is also an example of the results that may be accrued with that policy.

However, we cannot fail to give a reminder that any plan governed by the militarist ideology in a nation inevitably leads to authoritarianism. In a country without a democratic tradition, like Argentina, that alternative has already occurred, and there is no guarantee that it will not be repeated in the future. Therefore, the public's active participation in national issues is essential.

Upon leaving the scientist's house, we bought the newspaper, which we read on the return trip. One of the headlines read: "Change in the Argentine Nuclear Plan," and the article noted that Rear Adm Castro Madero had stated that, as a result of the action taken by Great Britain in the South Atlantic, Argentina was forced to make changes in the philosophy of the Argentine nuclear plan.

The newspaper stated: "One result of this is studying the feasibility of building an atomic submarine."

The commentary pointed out: "It is regrettable that this should happen, because Argentina had made the decision to use all its capacity for peaceful purposes; but Great Britain's use of nuclear submarines which wiped out the operational capacity of our war fleet led us to make that decision."

While the train covered the final meters, the ideas expressed by Sabato a short time earlier took on a significant force. The Argentines, tremendously belligerent in dealing with their issues, have the opportunity to begin the great debate which Jorge Sabato mentioned.
2909
CSO: 5100/2233

BRIEFS

NUCLEAR BOMB PROJECTS DENIED--Rio de Janeiro, 7 Aug (AFP)--Gen Alacyr Frederico Werner has asserted, in statements published in this city today, that there is no government-level project to use nuclear energy for warlike purposes. The general, who is chief of staff of the armed forces, accepted the use of nuclear energy for the propulsion of ships and submarines, but he ruled out any possibility that the country would develop or manufacture nuclear devices. Werner stressed that Brazil has chosen, in accordance with its peaceful policy, to apply nuclear energy for peaceful purposes for the benefit of the people and the development of the country. Werner said in conclusion that the armed forces would consider the hypotheses of possessing a nuclear bomb only in case a probable enemy had one, but there is no such enemy. [Text] [PY072002 Paris AFP in Spanish 1759 GMT 7 Aug 82]

DEMONSTRATION STAGED IN ANGRA--Angra dos Reis, Rio de Janeiro--Nearly 500 persons staged another demonstration here against the construction of nuclear plants in Brazil yesterday. The demonstration, which consisted of parades and debates, was sponsored by the group "Hiroshima, Never Again," which is made up of representatives of 30 organizations and the Workers Party. [by FOLHA's special correspondent] [Excerpt] [PY170320 Sao Paulo FOLHA DE SAO PAULO in Portuguese 9 Aug 82 p 5]

CSO: 5100/2240

USSR TO AID IN BUILDING CIENFUEGOS NUCLEAR PLANT

PA061546 Havana International Service in Spanish 0000 GMT 5 Aug 82

[Station commentary]

[Text] Cuban and Soviet specialists recently approved all the details for the planning and construction of the first nuclear powerplant to be built in Cuba, with the Soviet Union's technical aid. The powerplant, to be built in the port city of Cienfuegos, will include two electricity complexes with 850 mw. The model project, used previously in similar works in the Soviet Union and other socialist countries, was modified in keeping with Cuba's climatological and natural conditions. Examples of this are the new coatings and anticorrosive materials used, which are ideals for tropical climates. Another characteristic of the new plant is that it will be able to withstand earthquakes of up to 8 degrees on the Richter scale, waves and the shock of being struck by a 20-ton plane flying at 750 km per hour.

It must be noted that such a project is no longer an isolated case in our country, where new works are undertaken every year to adjust Cuba's infrastructure gradually in an effort to achieve development.

In the energy area in particular, we must note that Cuba's need to produce more electricity is closely connected to the imperative obligation to implement the policy of industrialization and socioeconomic development outlined by the revolutionary government after January 1959. Until then, the distribution of electricity had been conceived to cover the needs of the island's large cities and towns, its most important commercial centers [words indistinct]. Meanwhile, in the peasant zones and in the homes of the lower classes the lack of this service accompanied hunger and the lack of hygienic conditions.

In 1958 the U.S. company that controlled the electricity business here in Cuba had only installed 397 mw of power. With this inheritance and the blockade imposed by our northern neighbor, it was only logical to assume that it would be impossible to further the revolutionary government's industrial expansion plans. Therefore the breakthrough of our country's electrical industry began immediately.

In its effort to promote the electrical sector, Cuba received the Soviet Union's determined and firm support. The first agreement, signed in 1960 by the two nations led to the construction of a thermoelectric plant in the city of Santiago de Cuba, in the easternmost part of the island, and another in Havana's Mariel area. Other energy plants were built later throughout the country. During the 1976-80 period some $600 million were invested and the installed capacity increased by 1,069 mw, almost doubling the system's capacity in 1975.

During the 5-year period ending that year, Cuba produced 5,885,376 mw of power. Despite this decisive effort, which resulted in a marked increase in our country's production of electricity, the increasing needs derived from the difficult path of development are yet to be satisfied. This is how the need to build the first nuclear powerplant in Cuba came about.

CSO: 5100/2240

FEAR OF POSSIBLE NUCLEAR CONTAMINATION VOICED

Johannesburg THE STAR in English 26 Jul 82 p 16

[Article by Bruce Heilbuth]

[Text]

Hoo boy, will we ever be free of worry about that damn great atomic pile on the other side of Table Bay? To Cape Town people it's like endemic toothache, always in the background and flaring into the foreground each time there's a new alarm there.

Last month three crooks bluffed their way through the Koeberg security. They were after money but it might have been a trio of saboteurs.

Last week it was a fire in the nuclear plant's electrical building.

In between the two was the fatal bomb blast in the liftshaft of the President's Council buildings in the city. And the echoes of the murderous IRA incidents in Central London add to the fear psychosis that has plagued this controversial power project from the start.

Says the acting chairman of Koeberg Alert, Professor Arnold Abromowitz: "The public will want more than bland assurances that these incidents will not happen after the reactor has 'gone critical', when they could have incalculable health and safety consequences."

Nor was the local citizenry cheered much by a report by the Koeberg power station manager and tabled at a city council Exco meeting after the fire incident.

It stressed that "no emergency situation is envisaged which would require immediate evacuation in haste. People in the contaminated areas would be evacuated in a controlled manner in small groups."

That's just dandy. But it's not the size of evacuation groups that concerns us, nor the extent of the control exercised. It's the mere thought of having to get out at all, however remote the possibility. A pox on Koeberg, in fact.

For the record, the R1 800 million N-plant will become operational in a few months.

If the worst came to the worst, perhaps we city workers, barely 20 km away, could all go underground like moles — for Cape Town is rapidly becoming a split level city.

When Sol Kerzner's mammoth new Southern Suns hotel is completed late next year a vast extra tract of underground shopping space will be added to the many acres already developed.

In addition there is a plan for Thibault Square, near the bottom of Adderley Street, to be hollowed out to accommodate three levels of underground parking space for 600 cars. This would be the deepest occupied excavation in the city — and could be a pointer to the direction of Cape Town's future development: not upwards, but downwards.

Something drastic has to be done about Cape Town's off-street parking problem, anyway. It's chronic in the minuscule centre city area and very costly.

The other talking point down here is the exposé, if one can call it that, of the widespread sale locally of sharkmeat in many different forms.

We'd always thought sharks were caught mainly for their fins, which are exported mainly to the Far East for making soup. In fact it emerges that we have been eating it for years under various aliases . . . silver or pearl flakes, tope, dark fish, monk fish. And enjoying it. There's also shark biltong, said to be as good as any of the conventional types and half the price.

Just how big the local industry has become is evident from the annual catch of two million sharks by one Western Cape fisheries co-op alone.

Those people who shudder at the thought of eating potential maneaters need not worry on this score. The shark caught are Vaalhaai and Ratelahaai, which weigh up to 300 kg but do not attack man.

I still won't eat it!

CSO: 5100/5693

IAEA 'CONTROL' OF NUCLEAR ENERGY PROPOSED

Eleven Member States

LD290602 Moscow TASS in English 0554 GMT 29 Jul 82

[Text] Moscow July 29 TASS -- In the past years the International Atomic Energy Agency has become a recognized centre for the promotion of international cooperation in peaceful uses of atomic energy and made an important contribution to the prevention of the spread of nuclear weapons in the world, Andranik Petrosyants, the chairman of the USSR State Committee for the Utilization of Atomic Energy, writes in PRAVDA. In the article devoted to the 25th anniversary of the IAEA he points out that 11 states are now members of the agency.

The most important aspect of the activity of the International Atomic Energy Agency, the author writes, is the exercise of control over the use of nuclear material and equipment. At present the agency controls about 98 per cent of nuclear plants and the overwhelming part of nuclear material in countries that have no nuclear weapons. In more than 40 of such countries the entire activity in the nuclear sphere is under the IAEA control. But the world public is concerned over the fact that in some non-nuclear countries a part of nuclear plants and materials is not yet under the agency's control. This particularly refers to Israel and the Republic of South Africa, countries that are conducting an aggressive, expansionist foreign policy.

The system of control exercised by the IAEA is described not without reason as a unique phenomenon, the article says. For the first time it has been possible to agree on international control on territories of a great number of sovereign states which proves irrefutably that given good will it is possible to agree also on control in other spheres of arms limitation and disarmament, to ensure the confidence of the world community that the countries will honour the commitments they have assumed.

The USSR attaches great significance to further development of the existing system of control, the author writes. The necessary research and developments are implemented in the Soviet Union.

The training of IAEA inspectors and personnel for national systems of stock-taking and control of nuclear materials are regularly held. The Soviet Union also gives support to other measures for non-proliferation of nuclear weapons implemented by the agency. Of special significance among them are the organizing and technical measures for internationalization of separate elements of the nuclear fuel cycle. "The activity of the IAEA over a quarter of a century, the activity that was successful on the whole, gives the grounds to hope that the agency will continue making a worthy contribution to international cooperation, to ensuring confidence and security in the world."

'Negative Phenomena' Noted

LD281752 Moscow TASS in English 1718 GMT 28 Jul 82

[Text] Moscow July 28 TASS -- "The whole history of the International Atomic Energy Agency (IAEA) is an example of successful cooperation between countries with different social systems in the interests of preserving peace," IZVESTIYA writes today.

"The existing international regime of non-proliferation of nuclear weapons, which has proved to be viable and effective," the article points out, "not only contributes to maintaining stability in international relations, but also creates a reliable basis for developing large-scale cooperation in the field of peaceful uses of atomic energy. This international cooperation was initiated by the USSR.

"Over 25 years IAEA has succeeded in resolving many problems posed to mankind by its growing demand for energy, in the field of industry, agriculture, medicine and scientific research".

"But," the newspaper goes on to say, "with a generally favourable process of peaceful uses of atomic energy it must be noted that there have appeared alarming aspects in the field of nuclear energy in the world recently. Among the negative phenomena note shall be made in the first place of the line of conduct chosen by the U.S. administration, and its course for building up the arms race and stake on positions of strength."

"The main way to lessening and ultimately eliminating the motives behind the wish to obtain nuclear weapons is a general improvement of the political climate in the world, elimination of seats of conflicts, attainment of real results in curbing the arms race and in disarmament, ensuring security guarantees of non-nuclear states and creation of non-nuclear zones. A decisive role in that is played by the specific measures towards lessening the threat of nuclear war. And in this connection one can hardly overestimate the significance of the history-making move of the USSR, which committed itself not to be the first to use nuclear weapons," IZVESTIYA stresses.

CSO: 5100/2240

ELECTRIC POWER COMPANIES SIGN CONTRACT WITH NUCLEAR RESEARCH CENTER

Copenhagen INFORMATION in Danish 27 Jul 82 p 1

[Article by Torgny Moller]

> [Text] The Riso research station has signed a contract with ELSAM [Organization for Coordination of Electric Power in Jutland and Funen] and ELKRAFT [Electric Power] on nuclear cooperation.

The electricity associations ELSAM and ELKRAFT have entered into an agreement with Riso on nuclear cooperation with the Riso research station. The agreement means that Riso will receive money from the electric power plants in return for making its expertise available to them--for example, when the electric plants need expert assistance in dealing with another state institution like the Environmental Agency which at the moment is reviewing the salt dome studies made by the electric companies.

This was disclosed at a meeting of section leaders at the research station at which the management and section leaders also estimated that the current situation with regard to nuclear power means that this source of energy will not start being introduced for at least 10 years. Riso has therefore made it clear to ELSAM and ELKRAFT that if Riso is to leave its nuclear power expertise "lying in a waiting mode" for 10 years, the electric companies will have to pay for it. Riso and the electric companies have held talks on the matter over a long period of time, but in July the "nuclear cooperation" program was agreed on. As they said at the meeting, this agreement enjoys a high priority at Riso.

It opens up the possibility that the electric companies can use Riso as a base for the anticipated technical discussions with the authorities on such things as the storage of highly radioactive waste in salt domes in West Jutland. For Riso, the agreement means an increase in the institution's total mass of contracts, in other words, more or less commercial contracts that guarantee the research station a certain amount of independence from the state.

At this time, Riso has total contracts worth 43 million kroner--but a budgeted deficit of 1 million kroner. However, new contracts are on the way and some of the contracts are more profitable than others. Thus there is currently a contract with a Japanese firm that has created a stir at Riso because it is so "secret" that the management will not say how large it is--only that it provides Riso with a covering payment of 1 million kroner.

Dissatisfied Section Leaders

At the same meeting of section leaders, criticism was also voiced of the so-called "spring" and "fall maneuvers" at Riso, e.g. the so-called re-evaluations of the work of all sections which the management has instituted, partly for the purpose of setting up an independent management section.

The criticism emerged when director Niels Busch presented a so-called "conversion pool" for Riso activities. It is a list of the major areas that Riso should give the highest priority and several section leaders protested against the clear thrust toward nuclear power expressed by the list. Section leader Carl Jorgen Christensen felt that wind power, which is officially given a high political priority, should have been mentioned among the major areas. It was not. Section leader Skytte Jensen said that biotechnology should be included as an item. The management will take a stand on this later. And section leader Heinz Floto criticized the whole re-evaluation program, which he said created confusion among Riso workers, while section leader Niels Hansen criticized what in hiw view was the narrow focus on nuclear power in the conversion pool.

The management did not agree with this criticism and said that Riso's facilities had to be taken into account.

The priority list has not yet been presented to Riso's cooperation committee.

6578
CSO: 5100/2235

PROGRESS IN RESEARCH ON HIGH TEMPERATURE REACTOR

Frankfurt/Main FRANKFURTER ALLGEMEINE in German 21 Jul 82 p 25

[Article by Kurt Rudzinski: "Power and Heat From the High Temperature Reactor; No Core-Meltdown in Case of Cooling Failure/Energy for Coal Processing"]

[Text] Safety is a matter of life and death for reactor technology. Although conventional nuclear power plants with light water reactors also fulfill the safety requirements demanded of them, it is a characteristic of the high temperature reactor (HTR) that its safety is considerably greater. The helium-cooled high temperature reactor or spherical fuel element reactor, which Prof Rudolf Schulten (Juelich Nuclear Research Center) has been developing since 1964, simultaneously constitutes the only really important contribution by the FRG to the utilization of nuclear energy. The other reactor types--light water reactors (LWR) and breeder reactors--have been borrowed from the United States.

The appeal of Schulten's idea lies in the simplicity of principle of his reactor system and in its "inherent" safety which also depends on physical laws. If the cooling fails, its reactor core cannot melt down, but on the contrary the chain reaction of the uranium fission breaks off by itself when the temperature slowly rises, because the HTR has a "negative temperature coefficient of reactivity." On the other hand, this implies that its output can be regulated merely by regulating the flow of collant gas, which is in fact being done.

The basis for the simplicity of the HTR is the use of tennis ball-sized graphite spheres as fuel elements. These contain the nuclear fuel in tiny particles firmly embedded in the exceedingly dense "pyrocarbon." Due to their high temperature resistance, mechanical stability and density they make the entire complicated and sensitive shell and structural framework of the reactor core in the light water reactor and the breeder reactor superfluous. In dense masses in the cylindrical graphite-lined cavity they themselves form the reactor core. Schulten developed this concept after he had experienced the cumbersome and time-consuming exchange of fuel elements during a visit to an English power plant. The graphite spheres are continuously inserted from the top into the reactor space. They gradually "flow" down by their own weight. There they are withdrawn individually, and after ascertaining the degree of burn-up, they are reinserted into the reactor or discarded. For this reason there are no interruptions in operation for exchanging fuel.

Due to the physical properties of the graphite, Schulten in a simple manner avoids the great metallurgical difficulties which face reactor engineers because of the metallic fuel element cladding, which is highly sensitive to neutron bombardment and overheating at temperatures as low as 800 degrees, in the supports of the reactor core of the light water reactor and of the breeder. Graphite does not melt, but gasifies only at about 3,600 degrees Celsius. In addition, the spheres safely contain the radioactive fission products up to 2,000 degrees. (With the AVR experimental reactor built at Juelich, operational temperatures of 950 degrees have been reached for 3 years.) Graphite is totally unaffected by the neutron bombardment. It also moderates the energy-rich neutrons, which is the precondition for the controlled process of uranium fission. In the light water reactor the water assumes this function and may therefore--and also in order to assure safe heat transfer--under no circumstancs evaporate.

Another advantage of the graphite balls lies in the fact that reactor disturbances take place slowly. Since the balls contain relatively little uranium in comparison to the graphite mass, the power density, that is to say the heat emission each second per cubic meter of reactor volume, is only 6 megawatts for the HTR. For the light water reactor it is 80 megawatts and for the breeder reactor as much as 600 megawatts--an enormous amount of energy, the safe control of which presents a decisive disadvantage for the breeder, which requires extraordinary expenditures for safety. The time available in which to shut down a reactor is also characteristic. In the event of a malfunction the light water reactor has 20 to 30 seconds available, but the breeder less than 5 seconds. For the HTR, on the other hand, it is 3 hours; that is to say, sufficient time for intervention and repairs.

A German safety study for a 1,160 megawatt HTR reactor has, as a comparable U.S. study (AIPA [expansion unknown]) showed years ago, confirmed the extremely high degree of safety of this type of reactor and the very long malfunction time constant. It is in any case characteristic that the actual analysis of cases of malfunction for the high temperature reactor does not even begin until the point where it ends for the light water reactor, that is to say in the range of "worst conceivable accident."

If, as a result of any kind of defect, even those difficult to imagine, a portion of the helium collant were to escape from a high temperature reactor, only those who work at the power platn would possibly be affected. Helium does not become radioactive. The radioactivity of the gas which depends on trace contamination is so small that even if the gas we e to leak outside, the radiation limits permitted at the fence of the power plant would not be exceeded.

The great safety alone should make the high temperature reactor the preferred, if not the only acceptable, reactor for power production. This is even more valid since hot steam of 550 degrees and more can be produced with helium.

However, this makes a power generation efficiency of about 40 percent possible instead of the approximately 30 percent available with light water reactor steam which is only about 300 degrees, something which in practice means a 25 percent greater thermal utilization. This could have been demonstrated long ago by the HTR power plant with 300 megawatts output which is under construction near Uentrop/Hamm, if an exaggerated and bureaucratic licensing method had not constantly added new, costly and time-consuming safety conditions, which--even more than for the LWR--often enough do not bring any additional safety.

The competitiveness of the high temperature reactor as compared to the light water reactor should scarcely come into question. If at all, HTR power would be only a few percent more expensive. But if one takes into account the high availability due to the technically simple design and the low subsequent costs which result from the simpler interim and final storage of the spent spherical fuel elements, the economics of the high temperature reactor should appear more favorable. In addition, due to its different neutron spectrum the HTR can turn thorium into the nuclear fuel uranium 233. This would make it possible to stretch the nuclear fuel reserves by a factor of eight.

A new way for the HTR technology is aimed at building standardized small HTR modules with a thermal output of 200 to 250 megawatts for steam production and process heat. Because of the small dimensions steel pressure vessels may be used, just as for the light water reactor, instead of the prestressed concrete vessels necessary for the large HTR reactor. Such modules can be connected if needed, so that they achieve the thermal output of large power plants. Economic production units could be achieved by connecting only four components, in the opinion of the Society for High Temperature Reactor Technology. The fundamental principle for the module design is to obtain a maximum degree of "passive safety." The 3-meter free diameter of the "reactor core" has been chosen so small that in the event of a coolant failure all the released heat can be given off without additional measures toward the pressurized vessel through thermal conductivity and radiation.

The particular advantage of this system would lie in the high flexibility of the plant size as well as in a reduction of the construction time and licensing procedures through standardization. Due to the high degree of safety, such modular plants could also be built near cities, and for the production of district heat as well as of power. Furthermore, the small construction units should be suitable for export to nations with little industrialization.

It will certainly take some time before the great thermal potential of the HTR can be utilized for chemical processing as well. Of special interest is coal processing; but it is primarily a matter of producing synthetic gas, a mixture of carbon monoxide and hydrogen, which can be produced by gassification of coal with hydrogen. From that one can among other things produce methanol with conventional large-scale technology, which is suitable directly as automobile fuel or can be converted catalytically with zeolites into carbohydrates. Schulten also proposed a new kind of method for chemical district heat transportation. Although the competitiveness of the synthetic products has not been proven at this time, coal processing constitutes a vital necessity for German coal mining. This is why the Land of North Rhine-Westphalia has such vital interest in the development of the HTR.

For process heat, diverting and utilizing the heat with these high temperatures still poses great difficulties. In order to extract synthetic gas from brown coal, temperatures of 700 to 800 degrees are necessary, and for hard coal--according to the Lurgi method--as much as 800 to 900 degrees. Since the heat resistance of conventional metal alloys are no longer sufficient for such processes even at temperatures above 750 degrees, intensive work is under way at Juelich on the development of high temperature-resistant metal alloys, which can last for decades, for heat exchangers, separation furnaces and fittings. One of these synthetic materials has already passed endurance tests of more than 50,000 hours at between 800 and 900 degrees. However, the goal is a synthetic material which can safely resist temperatures of more than 1,000 degrees. Ceramic materials such as silicon nitrite seem to be promising. The development of this, in which Rosenthal Technik AG is a major partner, still requires a great deal of fundamental research.

With the great, inherent safety of the high temperature reactor and with the promising application possibilities, the FRG possesses a unique advantage, yes a trump card in nuclear technology. It would be irresponsible to break off this development, which is what the Research Ministry is leaning toward Furthermore, the high temperature reactor is the only reactor type which perhaps offers the chance of making nuclear energy acceptable to its opponents as well.

11949
CSO: 5100/2230

FRANCE

PHENIX REACTOR MALFUNCTIONS: CAUSES CITED

Paris REVUE GENERALE NUCLEAIRE in French May-Jun 82 p 298

[Text] Investigations of the 29 April incident in the Phenix breeder reactor are still continuing. But several days after the incident, the first examinations made by technicians led to the following observations (reported in an inhouse CEA [Atomic Energy Commission] document).

1. On Thursday, 29 April at 2145, while the reactor was functioning at two-thirds of its nominal power, the hydrogen detection device was activated, indicating a leak and the start of a reaction between steam and sodium in the steam generator no 2 (GV2).

The instructions for such an event (stopping the reactor, then draining the water and steam from the three steam generators, and filling them with nitrogen under 7 bars) were immediately implemented, which stopped the sodium-water reaction.

It will be observed that the safety membranes of the steam generator involved remained intact, which shows that the rise in pressure due to the chemical reaction did not reach the point of rupture, 10 bars.

2. Because of the failure of two nitrogen supply valves of the GV2, which were temporarily jammed, the water-steam part of this system was not filled with nitrogen. The operators did not immediately realize this.

As there was no counterpressure to block its passage through the leak, the sodium was able to penetrate gradually into the water-steam circuit of the GV2's reheater.

3. Friday, 30 April, 1900 hours. After the release of the nitrogen intake valves, this sodium reached the main valve (then in a closed position) blocking the steam duct leaving the GV2's reheater. This valve is designed to operate with water-steam, not in the presence of sodium. A slight leak of sodium to the exterior caused a fire to start. The fire was quickly extinguished by the immediate response of the security services.

4. The consequences of this situation on the use of the reactor are now being evaluated.

The first observations suggest:

a. That only the GV2's reheater was affected by the incident and that the other parts of this steam generator (heater, economizer-evaporator) are intact;

b. That the quantities of sodium going through the steam insulation valve remained limited and were present in just a few meters of the duct.

More extensive investigations in the days to come, will enable us to identify the nature and location of the leak, to better understand exactly what happened, and give us the information to make a decision--if necessary--about modifying the equipment and procedures. It seems quite likely that at least a part of the 12 modules of the GV2 reheater will have to be removed and replaced.

The results of this analysis, which should be ready in a few weeks, will give the safety authorities information on which to determine the conditions and time for starting the reactor in operation again.

5. Generally speaking, it will be observed about these incidents:

a. That they occurred in the non-nuclear part of the plant.

b. That the chemical reactions taking place involved non-radioactive sodium of the reactor's secondary circuit. At no time did these incidents cause the slightest risk to the environment or to the plant's operating personnel. On this occasion the personnel showed perfect calm and coolness in their response.

c. That the sodium-water reaction is the first affecting the Phenix steam generators since this prototype plant began to operate in 1974.

d. That through the protective and safety measures taken in the reactor's design, this reaction lasted for several minutes, bringing together not insignificant quantities of steam (about 1 kilogram) and sodium without any repercussion outside.

In closing, these events should not cause us to forget that the Phenix plant, since it began to operate, has produced 10.5 billion kWh with an average load factor above 60 percent.

7679
CSO: 5100/2228

REPORT ON FUEL CYCLE URGES MORE REPROCESSING CAPACITY

Paris REVUE GENERALE NUCLEAIRE in French May-Jun 82 pp 293-294

[Article on the report of the Agency for Nuclear Energy: "Nuclear Energy and its Fuel Cycle: Prospects Until 2025"; 287 pages, OECD, Paris, 1982; ISBN 92-64-22306-1]

[Text] 1. There are no reasons of a technical or industrial nature that would prevent the supply of nuclear fuel and fuel cycle services from meeting a realistic level of demand for the rest of this century and even well beyond.

2. In the short term, a great number of firm orders for reactors will be required if the projected nuclear programs are to be actually carried out.

3. The present level of supply of fuel cycle services greatly exceeds the immediate demand, but an expansion in several areas will be necessary before the end of the century in order to follow the projected progression of demand.

4. In the long term, the maintenance of the nuclear energy resource will inevitably lead to changes in the nuclear fuel cycle; in particular, there will be a transition to reactors that use fuel more efficiently, such as the breeder reactor.

5. Countries which lack abundant energy resources (particularly uranium) are interested in an accelerated introduction of breeders in their industry.

These are some of the main conclusions of the report which the OECD's [Organization for Economic Cooperation and Development] AEN [Agency for Nuclear Energy] has just published under the title of : "Nuclear Energy and its Fuel Cycle: Prospects Until 2025." This report analyzes the prospects of the worldwide and regional supply and demand of uranium, thorium, heavy water, and services related to the fuel cycle, such as uranium enrichment, the manufacture of fuel, and the storage and processing of irradiated fuel. The report covers three successive periods: the short term (until 1990) and the mid term (1991-2000), based on projects and projections provided by the governments involved, and the long-term period (until 2025), based on a range of hypotheses.

In recent years, the rapid evolution of the conditions governing economic and energy growth in the world, along with changes in the conditions affecting nuclear energy itself, have very quickly invalidated a number of forecasts. Of course, this is also true for projections about the expansion of the nuclear power capacity, given the changing nature of national projections in this area, especially when they cover half a century. In spite of these difficulties, it is felt that the analyses contained in this report are of use for the long-term planning undertaken by governments, the nuclear industry, electric power companies, and even those who handle related services.

For the mid-term period, from 1990-2000, the report reaches the following conclusions:

The growth of the nuclear power capacity during this decade is much less certain. A good many countries are preparing plans for this period, and those which have provided estimates expect the expansion of nuclear power to continue. Based on the projections of the working group on needs related to the nuclear fuel cycle, the nuclear power capacity in the OECD countries should be between 500 to 680 GWe between now and the end of the period; for the CAEM [Mutual Economic Assistance Committee] countries, the corresponding figures are 170 to 290 GWe, and for the rest of the world, from 90 to 120 GWe. However, because of political decisions and international events whose impact goes beyond the attributions of the working group, the nuclear power capacity could be outside these ranges.

Storage and Reprocessing

As in the short-term period, nuclear power should consist essentially of water reactors, and it may well be that many countries will not reprocess their irradiated fuels. Some countries may encounter difficulties in storing their irradiated fuel, unless adequate storage facilities both at the reactor site and at a distance, or long-term storage facilities, are built at the right time. The construction and operation of these storage facilities could be an important sector of activity in itself. However, no technical problems are expected in this area, and arrangements of an institutional nature should be carefully examined by the appropriate national and international bodies. The working group felt that this matter exceeds the limits of its present mandate. It is to be expected that many countries will reprocess at least part of their irradiated fuel in order to produce the plutonium needed for the generation of fast reactors toward the end of the century. The calculations of the working group show only the capacity required for this purpose.

Moreover, it will probably be necessary to increase the reprocessing capacity if, from the point of view of the environment, it were considered desirable to reprocess all the irradiated fuel or if it became of interest to use plutonium in thermal reactors. This expansion would have as its inevitable corollary the establishment of facilities to store plutonium and the quantities of highly radioactive liquid or packaged wastes that would be produced. However, there is still a sizeable margin of maneuver, allowing the countries to adapt their facilities and procedures to suit local conditions. As in the case of the facilities which store irradiated fuel, the necessary arrangements should not present any insurmountable difficulties.

Concerning the supply of uranium, the working group on needs related to the nuclear fuel cycle concluded from a comparison of its results with those of the AEN/IAEA [International Atomic Energy Agency] working group on uranium resources that meeting the demand for uranium during this period should not cause insurmountable technical or institutional problems. Constraints other than those of a technical nature might arise, some of which could have an impact on the theoretical supply capacities and demand projections. The stagnation of the uranium markets during the present decade may sometimes slow down commercial prospecting and mining ventures even if, through long-term contractual arrangements, the suppliers do have a stable demand and a reasonable price in economic terms, which they need. It is clear that the possibility of having adequate supply levels in the longer-term period (after 2000) will depend on the success of the prospecting and mining done in the short or mid term, which in turn will depend on the establishment of firm projections of demand and the establishment of favorable political, economic, and commercial conditions.

No technical problems are expected in the establishment of appropriate facilities for the supply of heavy water, of enrichment services, or fuel manufacturing during this period, for the construction time of these facilities is short in comparison with the time required to build a reactor. In the area of enrichment, there will probably be competition between the suppliers. The North American area of the OECD not only has a capacity that greatly exceeds its own needs, but it is increasing this capacity. In the European area of the OECD, some large facilities are in operation or have reached various phases of construction or planning. The needs of the Pacific area of the OECD exceed its presently predicted capacity, but the member countries are actively studying the possibility of undertaking a major enrichment project in that area.

7679
CSO: 5100/2228

FRANCE

BRIEFS

CHINON FUEL ELEMENT PROBLEM--After a 3-week interruption, the fuelling of the Chinon B1 reactor resumed on 26 May. The deterioration of five fuel elements (of a total of 157 elements) caused by the "defective assembly of a handling device" had caused the fuelling to be stopped on 6 May, 3 days after it had started. The damaged elements have been replaced. The fuelling operation was completed in early June. The reactor is scheduled to go critical in mid-July, with the first kWh to be delivered to the power system in early September. [Text] [Paris REVUE GENERALE NUCLEAIRE in French May-Jun 82 p 298] 7679

CRUAS NUCLEAR PLANT TESTS--The first unit of the Cruas nuclear power plant (Ardeche department) began its overall test phase in early May. It should be connected to EDF's [French Electric Power Company] network on 1 April 1983. The entire plant, which consists of four 900-MW units, could operate at full power by the summer of 1984, or 6-1/2 years after the start of work on the project, said the construction chief, Mr Jean-Claude Postollec. In terms of power, Cruas will then be the third power plant in the Rhone-Alpes region, behind Bugey and Tricastin. The construction schedule was met, and the initial estimate of the cost of the plant, 6.2 billion francs in 1976, or about 12.5 billion francs today, was not exceeded. [Text] [Paris REVUE GENERALE NUCLEAIRE in French May-Jun 82 p 298] 7679

COGEMA BUYS URANIUM INTEREST--The COGEMA [Nuclear Materials General Company] has purchased stock in the firm, Imetal. The press release issued on this stock acquisition states: "Since the start of 1980, it has been apparent to government officials that movements in the stock of Imetal might give some cause for fear of a change in the structure of its capital, a change which might not be in accordance with our national interest. Through its subsidiaries, Imetal controls in France a significant production of uranium; abroad it holds a large part of the stock of a uranium mining company in which the COGEMA also owns stock (COMUF-SOMAIR-AMOK) [SOMAIR: Air Region Mining Company]. On two occasions, in February 1980 and in April 1981, the government authorized COGEMA to acquire stock in Imetal. COGEMA now controls 17.33 percent of the stock of this company." [Text] [Paris REVUE GENERALE NUCLEAIRE in French May-Jun 82 p 297] 7679

PALUEL'S 1300 MW PLANT--Work is continuing smoothly at Paluel, where the first PWR [Pressurized Water Reactor] 1300 MW units to be operational in France are now under construction. The first unit will be connected to the electric power system sometime in 1983. Paluel is to have four units. In addition, nine other 1300 MW units have already been begun, and five additional units have been decided upon for the 1982 and 1983 programs. In all, 18 units may be considered as in progress. They are located at nine sites: Paluel, Penly, Flamanville (on the seashore), Cattenom, Saint-Alban, Belleville, Nogent, Golfech, and Chooz. [Text] [Paris REVUE GENERALE NUCLEAIRE in French May-Jun 82 p 294] 7679

CSO: 5100/2228

END

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13 September 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 161

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RAJYA SABHA DISCUSSES PAKISTAN'S 'ISLAMIC BOMB'

Bombay THE TIMES OF INDIA in English 4 Aug 82 p 5

[Text]

NEW DELHI, August 3 (UNI).

THE defence minister, Mr. R. Venkataraman, told the Rajya Sabha today that Pakistan was going ahead with the "process of enrichment of uranium" which could be used both for peaceful purposes and for manufacturing nuclear weapons.

Replying to Mr. K. C. Pant during question-hour, he said he got this information from the 'video tape of what is called the Islamic bomb' which he saw along with other members of the defence consultative committee.

Mr. Dinesh Goswami, wanted to know whether the tape could be shown to other members of parliament. Mr. Venkataraman said he had no objection, if the members so desired.

Replying to supplementaries he, however, said: "Whenever we see such reports we try to verify them from our sources and make contingency plans to meet the situation."

In reply to Mr. S. C. Jha, the minister explained that the government had no "positive information whether Pakistan is doing anything to further its nuclear capability."

The minister informed Mr. Satyanarayana Reddy that discussions on arms reduction between India and Pakistan would have to follow an agreement on the proposed no-war pact.

Mr. K. C. Pant felt that Pakistan's nuclear plan could not be explained in terms of "peaceful uses of nuclear energy." He wanted the government to take the people into confidence about its possible impact.

P.T.I. adds: Replying to the main question of Mr. S. C. Jha, the defence minister said the government had seen reports about the manufacture of certain types of rockets in Pakistan. While Pakistan was not known to be manufacturing advance warning and control system (AWACS) aircraft, it continued to develop its defence production capabilities. The government monitored all developments impinging on India's security for initiating appropriate measures to ensure full defence preparedness.

"I cannot say on the authority of the government that Pakistan is going to explode an atomic bomb," Mr. Venkataraman said in reply to supplementaries from Mr. Jha.

He said India had expressed its opposition to the U.S. to any assistance to Pakistan in developing its capability to manufacture nuclear weapons or to the supply of sophisticated weapons,

CSO: 5100/7137

TRADE UNIONS IN PORT CITIES PROTEST U.S. N-SHIP VISIT

Canberra THE AUSTRALIAN in English 13 Jul 82 p 1

[Text] WATERSIDE trade unionists were divided yesterday in their reaction to the visit of the US Navy guided missile destroyer Goldsborough to four Australian ports.

In Melbourne, members of the Waterside Workers Federation will strike in protest.

In Sydney, a federation spokesman said members would "take a look at it" when the ship arrived.

In Brisbane, "some form of protest" is expected.

And in Hobart, the federation branch was unaware of the visit, and will not take any action against it.

The visit by the 4750-tonne destroyer was announced by the Prime Minister, Mr Fraser, on Sunday.

The destroyer will start its tour in Brisbane on July 22 and will visit Hobart and Melbourne before leaving from Sydney on August 16.

Mr Fraser has refused to say whether the ship is nuclear armed.

The Victorian Premier, Mr Cain, yesterday reaffirmed his Government's opposition to visits by nuclear-powered or nuclear-armed vessels and said the destroyer would not be welcome in Victorian waters.

But he said the Government would not take any steps to prevent the Commonwealth exercising its constitutional power to promote such visits.

Mr Cain said Mr Fraser's decision to encourage a US warship to berth in Port Phillip Bay was politically provocative and the Federal Government had to accept legal, financial and moral responsibility for the safety of Victorian citizens.

He sought further details from Mr Fraser yesterday about the timing and duration of the visit.

The secretary of the Melbourne branch of the Waterside Workers Federation of Australia, Mr Geoff Swayn, saw Mr Fraser's action as a direct challenge to the trade unions.

"We will certainly be stopping work when the ship comes in, if it does come in," Mr Swayn said.

It is not clear whether the Goldsborough will use the Williamstown naval dockyard facilities, but Mr Swayn doubted in any case whether organised labor could actually stop such a visit.

The Tasmanian Premier, Mr Gray, said the State would welcome any US vessel and local unions had already allowed visits by two nuclear-powered ships, including the big aircraft-carrier, USS Enterprise.

The assistant secretary of the Queensland Trades and Labor Council, Mr Ray Dempsey, said yesterday he would not like to predict what union action would be taken.

"If another Truxton, or any other similar ship, was again to enter a Queensland port I would expect some form of protest," he said.

"Should the issue erupt among the union movement in southern States, naturally the Labor Council executive would have to consider giving support."

The president of the Waterside Workers Federation in NSW, Mr John Healy, said it was the union's policy "not to play around with anything with nuclear weapons on it".

CSO: 5100/7546

AUSTRALIA

DEMOCRATS OPPOSE STATE POWER OVER NUCLEAR FUEL INDUSTRY

Resistance to Legislation

Canberra THE AUSTRALIAN in English 13 Jul 82 p 1

[Article by Russell Schneider]

[Text] THE Australian Democrats decided yesterday to oppose any legislation introduced by the Federal Government giving the States more power over the nuclear fuel industry.

Their stand increases the likelihood of confrontation with the Government in the Senate where the Democrats hold the balance of power.

The leader of the Democrats, Senator Chipp, said in Melbourne such legislation might help to establish a nuclear fuel enrichment industry, which the party resolutely opposed.

It is understood the Government is planning to introduce the legislation after Parliament resumes next month, giving the States greater control over health and other aspects of uranium development.

The Government is studying a report from a committee set up to review the Atomic Energy Act.

Senator Chipp said yesterday: "The Federal Government is trying to implement the nuclear power industry through the back door by giving control to the States.

"But to do this they will have to introduce some enabling legislation to the Federal Parliament. We will oppose this all the way.

"The nuclear power industry is widely recognised as being on the way out. It is burdened by excessive capital costs, safety concerns and waste storage problems.

"Its economic benefits to Australia are dubious. It would be a folly for Australia to embark on what is redundant and discredited technology."

"It would be particularly disastrous if some of the manically pro-nuclear premiers were able to control and regulate the nuclear industry."

Government Reaction

Brisbane THE COURIER-MAIL in English 14 Jul 82 p 16

[Text] CANBERRA--Regulatory processes for a nuclear power and enrichment industry in Australia will be in force well before the industry gets under way, according to the Federal Government.

The National Development and Energy Minister, Senator Sir John Carrick, outlined the legislation yesterday, following the Australian Democrats' commitment to oppose it.

The legislation was foreshadowed some months ago, but is not expected to come before Parliament in the immediate future.

Negotiations are continuing with the states and the legislation is not expected to be completed this year.

"The new legislative base will not be promotional, but is intended to ensure that regulatory processes covering nuclear activities are firmly established before such activities arise," Senator Carrick said.

The National Energy Advisory Committee on Nuclear Power in Australia had emphasised the importance of having such legislation in place in advance.

Senator Carrick said the new legislation would recognise the respective constitutional responsibilities of the Commonwealth and the states.

Areas of environment, health and safety involved traditional state responsibilities and the legislation could be expected to reflect that.

Senator Carrick took issue with the Democrats' claims that the nuclear industry was no longer economically viable.

Independent research institutions had concluded that nuclear energy might meet about 40 percent of the energy market by 2030.

CSO: 5100/7546

AUSTRALIA

CONTROVERSY SURROUNDS BEN LOMOND URANIUM PROJECT

Brisbane THE COURIER-MAIL in English 13 Jul 82 p 15

[Article by Bill Ord]

[Text] **THE Opposition Leader, Mr Casey, did not know all the facts about the proposed $480 million Ben Lomond uranium development and had been too hasty in condemning it, Mr Bertrand Cahen, managing director of Minatome, said from Sydney yesterday.**

"It was most unfortunate that Mr Casey saw fit at the weekend to say that a Queensland Labor government would not let the Minatome project go ahead if it had not got off the ground before Labor gained power.

"It was equally unfortunate that he also said that, if the project were under way, Labor would close it down."

Mr Cahen, a Frenchman, said Mr Casey appeared to believe that the Minatome group was a purely French organisation which would supply uranium oxide for use in French nuclear weapons.

"This is simply not so," he said.

"My company is engaged in ensuring that there will be a majority Australian shareholding in the company now that the deposit probably will prove to be a viable proposition — if not now, then in the future in the light of today's international prices for uranium oxide.

"In addition, Australia's own internationally-accepted rules about the destination of its uranium would ensure that any exports from Ben Lomond could not possibly find their way into nuclear weapons.

Mr Cahen, who returned at the weekend from talks with his French principals, said it appeared Mr Casey did not realise exactly what the necessary $80 million capital outlay to develop Ben Lomond, 50 km west of Townsville, would mean in terms of jobs and a boost to the local economy.

He said conservation-movement objections to the project on the grounds of a possibly inadequate containment of toxic wastes which could spill over into the Burnett River, which supplies Townsville's water and irrigates valuable farmlands, would "be answered in due course."

When the company applied in April last year to the Charters Towers Mining Warden's Court for permission to develop, mine and process the Ben Lomond uranium deposit, "we put up what was no more than an outline of our plans," Mr Cahen said.

"Much detail still had to be settled, and we are sure that the Mining Warden's and the conservationists' fears of the possibility of water contamination will be allayed in the near future when we tell the Mines and Energy Minister, Mr Gibbs, about our plans in the matter."

A spokesman for Mr Gibbs said yesterday that Minatome's application to develop Ben Lomond was "in limbo" pending the company's response to objections raised by the Warden and conservationists.

"The Minister has power to over-rule the Mining Warden's objections, but he is entirely unlikely to do so unless he is satisfied that the company has made an adequate response to those objections."

The Townsville Regional Conservation Council co-ordinator, Mr Adrian Jeffreys, said yesterday that Minatome's and the Minister's attitudes were "quite unacceptable."

Objections to the Ben Lomond development had been raised in court, "so let them be answered in court," he said.

"The serious objections to Ben Lomond that were raised in public must be answered in public. The matter must go back to court."

CSO: 5100/7546

VICTORIAN LABORITES SEEK TO REVERSE SOFT NUCLEAR LINE

Melbourne THE AGE in English 13 Jul 82 p 5

[Article by Peter Stephens]

[Text] Members of the Victorian branch of the Labor Party are campaigning to overturn last week's ALP national conference decision which relaxed the party's opposition to uranium mining.

The campaign is believed to involve a wide range of rank and file members, from the Left and the Right, and from trade unions and party branches.

An organiser with the State branch of the ALP, Mr Gerry Hand, said last night he expected other States to join the campaign. "It is an attempt to mobilise opposition to the national conference decision," he said.

Organisers of the campaign said it began in Canberra immediately after the uranium debate in the national conference, when many delegates felt the party policy had been "sold out".

The organisers said the national conference decision had not been debated by the rank and file of the party, and represented an elitist position forced on the party membership from above.

The organisers said proper debate within the party could lead to the policy reverting to the strong anti-uranium stance which existed before the national conference.

It is believed that one option open is for rank and file members to demand a special State conference to put forward their opposition to the decision.

At the national conference, after days of intense lobbying, the delegates voted 53 to 46 in favor of a softer policy, which allows a Labor Government to honor existing uranium contracts.

The shadow Attorney-General, Senator Evans, told the conference the lobbying involved some "thuggishness" and threats to MPs' pre-selections.

The new, more moderate policy, would still prohibit a Labor Government approving new mines. It was strongly supported by the Opposition leader, Mr Hayden, his deputy Mr Bowen, and Mr Hayden's challenger for the party leadership, Mr Hawke. The Victorian Premier, Mr Cain, opposed the new position.

After the vote, which was seen as a defeat for the Left-wing, a Federal frontbencher and leader of the Left, Mr Uren, said "the rank and file will stir at the grass roots. This is not the end of it.

CSO: 5100/7546

BRIEFS

THREAT TO YEELIRRIE URANIUM--THE ALP's watered-down uranium policy would stop development of the $325 million Yeelirrie project in Western Australia even though almost $25 million had already been spent, the State Government claimed yesterday. The acting Minister for Resources, Mr MacKinnon, said: "The new policy would seem to me that the Western Mining Corporation's project could not proceed under a State Labor government. "The new ALP policy is so confusing--a mix of outright banning and conditional phasing out of uranium mines--that the Opposition owes it to the people of Western Australia and the companies concerned to say whether they would permit the Yeelirrie development. "The project, in which huge amounts have already been invested, would create several hundred jobs. The most damaging aspect of the ALP's position on this issue is the uncertainties set up in the minds of prospective developers. Overseas companies will obviously think twice before investing in a project under these circumstances." [Canberra THE WEEKEND AUSTRALIAN in English 10-11 Jul 82 p 6]

MARY KATHLEEN DEMISE--The north-west Queensland uranium mining town of Mary Kathleen would be dismantled and bulldozed into the ground later this year if not found economically viable, the Local Government Minister, Mr Hinze, said yesterday. Mr Hinze said he was hopeful the town could be preserved, but not if it proved to be a financial drain on the government. Mary Kathleen Uranium Ltd, a CRA subsidiary, expects to have stockpiled sufficient supplies of yellowcake to meet existing orders by the end of the September and does not plan to negotiate new contracts for the remaining ore. The town of 1000 people is solely dependent on the mine, which opened in 1956. Some families have lived there for three generations. The Minister was to have a meeting in Brisbane today with representatives of the mining company, Cloncurry Shire Council and the National Party Member for Mount Isa, Mr Bertoni, for final discussions on the town's fate. Last month, Mr Hinze visited the community and said he found residents willing to remain if the town could be saved. Today's meeting would centre on the feasibility of Mary Kathleen becoming a satellite suburb of Cloncurry Shire or being preserved as a model mining town for tourists, he said. [Brisbane THE COURIER-MAIL in English 19 Jul 82 p 3]

CSO: 5100/7547

AGREEMENT ON TARAPUR FUEL 'A HAPPY COMPROMISE'

Bombay THE TIMES OF INDIA in English 31 Jul 82 p 8

[Editorial]

[Text]

The agreement between India and the U.S. on enriched uranium supplies to the Tarapur atomic power plant is a happy compromise on what had unfortunately become a major irritant in Indo-U.S. relations. Mrs. Gandhi's visit to the U.S., intended to repair those ties, could not have begun on a more fruitful note. The *via media* arrived at allows both sides to maintain their essential principles intact without causing this country the material damage that the indefinite denial of nuclear fuel to Tarapur would have wrought. Under a 1963 agreement, the U.S. had contracted to supply Tarapur with enriched uranium until 1993. But it was willing to continue to honour the agreement only under the terms of the nuclear non-proliferation act it passed in 1978, which required India to accept full-scope safeguards before it could qualify for further shipments. This called for India to accept safeguards not only for Tarapur, which the Americans had helped to build, but also for all its future nuclear plants in the construction of which the Americans may have no hand. What is more, the Americans held that India could not reprocess spent fuel at Tarapur on its own even if they chose to renege on their 1963 commitment.

Under the agreement now reached, Tarapur will get enriched uranium, but from France, not the U.S. Supplies will no longer be interrupted since there will be no more U.S. congressional hassles for either the Indian government or the U.S. executive to worry about. The fresh fuel, as well as the existing byproduct of the American-supplied fuel already used, will be subject to safeguards. But they will not be "full-scope safeguards", which India had refused to accept. Since the U.S. will not be supplying fuel to a country that does not accept full-scope safeguards, America will not be in violation of its 1978 law. By getting the fuel it wants without having to accept full-scope safeguards, India's stand has been upheld. Since both fresh and spent fuel will be safeguarded at Tarapur, the U.S. should be satisfied. Since India cannot reprocess without U.S. consent ("joint determination" is the phrase) either the spent fuel that exists or the future residue from the use of fresh fuel, the U.S. has had its way. The agreement is no small gain for this country. By taking a stand on principle (refusing full-scope safeguards), it has shown that it can't be pushed around. By being flexible in devising a settlement (agreeing to "joint determination" of existing and future spent fuel at Tarapur), it has demonstrated its realism. President Reagan has done the same. He has not violated the U.S. non-proliferation law and he has ensured that neither India nor Indo-U.S. relations will suffer on this account.

CSO: 5100/7132

ANALYST PREDICTS CRITICISM OF TARAPUR AGREEMENT

Madras THE HINDU in English 31 Jul 82 p 1

[Article by G. K. Reddy]

[Text] NEW DELHI, July 30.

The agreement in principle reached between India and the United States for the use of French nuclear fuel at Tarapur has yet to be formalised through a trilateral arrangement spelling out precisely the terms and conditions under which enriched uranium will be supplied by France with adequate guarantees for continued IAEA supervision.

There will be a detailed discussion on the nature and scope of these safeguards when the French Foreign Minister, Mr. Claude Cheysson, arrives in Delhi on August 7 on his way back from a visit to China.

French view

The new formula for running the Tarapur plant with French fuel within the framework of the 1963 Indo-U.S. agreement has, no doubt, been worked out in consultation with France. But France is not likely to commence the shipments until the question of uninterrupted safeguards has been settled to its satisfaction.

Though France has not signed the Nuclear Non-proliferation Treaty for its own reasons, it has declared in no uncertain terms that for purposes of preventing proliferation it would abide by the spirit of the NPT in its dealings with other nations. It has been fully supporting the moves of the International Atomic Energy Agency (IAEA) to tighten the safeguards and plug the loopholes in the existing inspection procedures.

The new system evolved by the IAEA does not insist on fullscope safeguards on the entire nuclear establishment of a recipient nation, but applies the so-called pursuit clause to automatically extend the scope of inspection to any and every installation where even the derivatives of safeguarded nuclear materials are used by it. The conditions that are going to be attached to the French-supplied fuel for Tarapur are going to be much stricter and more comprehensive than those provided for in the 1963 Tarapur agreement.

The existing close relationship between India and the Soviet Union has hot inhibited Moscow from letting IAEA apply the pursuit clause to the heavy water supplied by it. The French Government is not going to make an exception in the case of India by agreeing to the present level of safeguards applicable at Tarapur under the 1983 agreement which fall short of the current IAEA stipulations.

But where the Government of India seems to have caved in, in its latest accord with the United States, is in yielding to the U.S. insistence that it is not entitled to reprocess the accumulated spent fuel at Tarapur without joint determination, which means prior American approval, even after the U.S. has ceased to be the supplier of enriched uranium for running the plant. It is this aspect of the new arrangement that is attracting considerable criticism since it has all the appearance of an abrupt climbdown by India after a lot of brave talk followed by threats of unilateral abrogation which would have freed the country from the obligation of co-determination.

At no stage of the protracted discussions on the fate of the Tarapur agreement has there been any doubt about India's ownership of the spent fuel which was subject to safeguards only as long as the U.S. fulfilled its part of the contract to supply fuel for the plant. The agreement clearly provided for re-processing of the spent fuel at some stage subject to certain conditions.

These conditions contained a provision that India should submit the designs and obtain the approval of the U.S. for building the reprocessing plant which was done in the normal course. But the actual reprocessing was subject to co-determination which meant prior U.S. approval, along with an understanding that the surplus plutonium derived from it would be sold to the U.S. at a mutually agreeable price.

When U.S. backed out

But when the time came for commencing the reprocessing to get rid of the accumulated fuel wastes, the U.S. started dragging its feet by suggesting other alternatives. One of the suggestions was that the spent fuel should be sent back to the U.S. for re-processing, but the Carter administration quietly backed out in the face of Indian acceptance. It raised environmental objections to taking back the spent fuel saying that the American public opinion would not agree to such an arrangement.

There was no need for the U.S. to make an issue of the reprocessing rights, since in the letters exchanged after the 1974 Pokhran test India had given a clear undertaking not to use the plutonium derived from the spent Tarapur fuel for any explosions. It was a cast-iron guarantee against possible misuses any time in the future.

The continued U.S. insistence on not only retaining the co-determination clause but also exercising it to prevent the reprocessing of the spent fuel is going to give the critics of the latest understanding a pretext to decry the whole thing as a sellout by India to placate the United States.

The 1963 agreement prohibited India from obtaining or using alternative fuel other than what was provided by the United States. If this condition is not dropped from the revised accord, India would not be entitled to experiment with or use the indigenously developed mixed oxide (MOX) fuel in the Tarapur reactor, while it is run with French-supplied fuel under the new arrangement.

CSO: 5100/7133

COMMENTATOR DISCUSSES PROBLEMS OF TARAPUR AGREEMENT

Bombay THE TIMES OF INDIA in English 5 Aug 82 p 8

[Article by Inder Malhotra]

[Text] IT is only fair that the settlement of the vexed issue of nuclear fuel for Tarapur during Mrs. Gandhi's visit to the United States should have been widely welcomed both here and in the U.S. Since the dispute over the supply of enriched uranium to the power station had become a major irritant in the relations between the two countries, its elimination, through a compromise which enables both sides to stick to their basic stands, cannot but be beneficial. But it will be equally fair to recognise that if the new deal on Tarapur has solved some problems, it has created some others. This awareness has indeed become sharper as the implications of what was announced on the first day of the Prime Minister's stay in Washington have become clearer.

Nothing underscores the gnawing doubts and uncertainties that persist more effectively than the sharp divergence, even after the latest Washington accord, between Indian and American positions on the vital question of reprocessing of the spent Tarapur fuel. Mrs. Gandhi herself, to say nothing of the officials accompanying her, has categorically declared that India has an absolute right to reprocess the spent fuel at Tarapur at a reprocessing plant that has been lying virtually idle since 1975, though it was designed and built in close consultation with the U.S. in order to establish its "safeguardability" in terms of the original Tarapur agreement signed for a 30-year period in 1963. But this has been stoutly contested by top U.S. officials.

They claim that even after the transference to France of U.S. responsibility to keep Tarapur supplied with enriched uranium, the reprocessing of the spent Tarapur fuel would continue to be subject to "joint determination by India and the U.S." Since this is a euphemism for U.S. veto, the contradiction between the two positions has to be resolved without delay. For continuing disagreement over reprocessing is bound to mar the accord that otherwise bypasses the earlier U.S. insistence on Indian acceptance of "full-scope" safeguards as a price for the assured supply of enriched uranium to Tarapur.

Storage Problem

Reprocessing is vital to India. For one thing, the spent fuel rods at Tarapur are already creating an acute problem of storage. For another, this country's inability to extract plutonium from the spent Tarapur fuel is bound to aggravate the difficulties faced by its all-important fast-breeder programme.

There is no reason, however, why the disagreement over reprocessing cannot be overcome. Unlike the Carter regime, the Reagan administration is not making a fetish of opposing reprocessing. Indeed it has reversed the earlier U.S. policy on the subject and allowed West Germany and Japan to reprocess the spent fuel in their possession. Why should it discriminate against India? But the trouble is that even after the reprocessing issue is somehow got out of the way, some other serious problems created by the new Washington accord will remain unless satisfactory solutions to them are found in the course of the forthcoming negotiations to fill in the details of the broad understanding reached over Tarapur. The chairman of the Atomic Energy Commission, Dr. Homi Sethna, is leaving for Washington for this purpose on Saturday. On the same day, the French foreign minister, Mr. Claude Cheysson, arrives in New Delhi to discuss his country's role in the future running of Tarapur.

The most painful problem that the Washington accord poses relates to the future of MOX, the mixed oxide fuel cycle, that this country has developed as an alternative to the U.S. enriched uranium. A sum of Rs. 35 crores and an enormous amount of scientific talent have already been invested in this venture. Is all this investment to go waste and future research and development in this field to be held up indefinitely? For that would be the inevitable consequence if it is agreed that Tarapur would be fuelled exclusively by France right uptill 1993, just as it would have been by the U.S. had that country not chosen to wash its hands of the responsibility of providing Tarapur with enriched uranium.

On the other hand, an arrangement can be worked out with France under which initial shipments of French enriched uranium can be replaced later by the indigenous mixed oxide fuel.

Doubts Unjustified

It may be that some doubts exist among policy makers about the efficacy of the MOX fuel. If so, these do not seem justified, especially in view of the fact that until recently this country was cold to French and Soviet offers of alternative fuel for Tarapur and was proclaiming — to U.S. negotiators, among others — its determination to run Tarapur on the mixed oxide fuel.

In fact, around this time last year, Mr. Narasimha Rao had bluntly declared in Parliament that the Tarapur agreement had been breached by the U.S. in all but name and therefore the only thing that remained to be done was to "give it a decent burial."

The slow stages in which successive shifts took place in this policy, leading to the Washington accord make an interesting study. From all accounts it seems that a decision in principle to avert the abrogation of the original Tarapur agreement was taken some time in December last in the wider interest not only of avoiding needless damage to Indo-U.S. relations but also of positively improving them. The U.S. response to this was prompt.

By April this year the broad outlines of the trilateral Indo-U.S.-French arrangement, announced in Washington last week, had taken shape. But it was in the second week of July, when the U. S. ambassador to this country, Mr. Harry Barnes, left for Washington in connection with Mrs. Gandhi's visit that a firm proposal, for which informal French consent had been obtained, was ready.

Even at that stage, however, it was not certain that the proposal would go through. Mr. Barnes said that he would have to sound the U. S. Congress to find out. He appears to have had extended talks with Senators Percy, Glenn and Cranston, among others, which should explain why only a relatively obscure Congressman has objected to the latest Washington accord on the ground that under it "India has the uranium and the U. S. gets the shaft." The rest of the Congress appears to have gone along with the deal.

The result of the U.S. administration's soundings at the Capitol Hill was communicated to New Delhi only a day before Mrs. Gandhi's departure for the U. S. and it was on that day (July 26) that the cabinet committee on political affairs was consulted. It promptly gave its approval for the agreement that had been negotiated by officials. France was formally notified that night.

Vigilance Vital

The objective of better relations with the U.S., especially at a time of acute turmoil in the region, is an unexceptionable one and it need not militate against the equally worthwhile objective of protecting essential Indian interests concerning Tarapur. However, to ensure that none of these interests is allowed to languish, it will be necessary to be vigilant and to examine with particular care the small print on the agreement to be signed with France.

For instance, it has yet to be clarified that when France takes over the responsibility for supplying enriched uranium for Tarapur the safeguards applying to the power station and allied facilities, including the reprocessing plant, would be exactly the same that were in force before the U.S. started insisting on "full-scope" safeguards and no more. This is important because the Tarapur safeguards do not include the "pursuit clause". The byproducts of Tarapur, including the plutonium from the reprocessing plant, can therefore be put to unfettered use elsewhere.

The argument that this country cannot refuse to accept a pursuit clause in its agreement with France, having accepted this provision in its protocol with the Soviet Union for the import of heavy water will not wash. The accord with Russia has an escape catch:

the pursuit clause disappears if this country returns to the Soviet Union as much heavy water as it might have imported. A similar arrangement cannot be made with France for the simple reason that India has no enriched uranium to return to the donor country. Once used in the reactor, enriched uranium, unlike heavy water, cannot be restored to its earlier state.

In any case, France is only taking over the responsibility that the U.S. was discharging in the past. It cannot therefore ask for more safeguards than this country was prepared to concede to the United States.

It also stands to reason that this country must insist on a foolproof delivery schedule for French uranium. After all, the U. S. did not formally renege on its commitments. It achieved this result by the subterfuge of delaying the shipments unconscionably.

Finally, Tarapur will continue to need spare parts and components for its proper maintenance and safety. The responsibility to provide these remains that of the U.S. which cannot disclaim it, especially at a time when it is insisting on a say on the reprocessing of spent fuel.

CSO: 5100/7139

NEWSPAPER REPORTS DOUBTS ON NEW TARAPUR AGREEMENT

Official Spokesman's Statement

Madras THE HINDU in English 2 Aug 82 p 1

[Text]

NEW YORK, Aug. 1.

An Indian official spokesman asserted on Saturday that India's right to reprocess spent nuclear fuel would be unaffected by the agreement for the supply of fuel from France to the Tarapur power plant.

India had conveyed to the United States even before the agreement the Indian position on its right of reprocessing as provided for in the 1963 agreement.

India had also told the United States that all rights and obligations following the 1963 agreement would cease to be operative once the agreement ran out its 30-year life in 1993.

On both these points the United States takes a different view and the two governments had agreed to hold talks to sort out the differences without prejudice to the arrangement for supply of fuel by France.

According to the spokesman, Article 2 (E) of the Tarapur agreement of 1963 with the United States says that reprocessing may be performed in India upon a joint determination by the parties that safeguards under the agreement will be effectively applied. Article 6 provides for safeguards and also that whatever is reprocessed is monitored adequately.

The 1963 agreement provides for transfer to the International Atomic Energy Agency the right to implement the safeguard provisions. This was done in 1971 when IAEA was authorised both by India and the United States to administer the safeguards.

Under the trilateral IAEA-India-U.S. agreement the responsibility for safeguards is thus with IAEA and India's position is that even now once the agreement is reached by the three parties India has the right to proceed with reprocessing spent fuel.

The spokesman said India had notified the U.S. Government in June, 1981 that it would commence reprocessing.

Dr. P. C. Alexander, Principal Secretary to the Prime Minister, had told the Under Secretary of State in the U.S. State Department dealing with the subject that India now had the right to reprocess without taking further action except giving legal notice to IAEA. The notice would mean stipulating dates for commencement of reprocessing so that IAEA can start taking action in fulfilment of its obligations.

The U.S. Government, however, takes the view that inspite of the trilateral agreement, joint Indo-U.S. determination is still necessary before India starts reprocessing.

Nuclear Policy Questioned

Madras THE HINDU in English 2 Aug 82 p 8

[Editorial]

[Text]

THE SKELETAL AGREEMENT announced in Washington on the future of the Tarapur atomic power station raises some troubling questions about the consistency and course of India's nuclear energy policy. The essence of the political deal struck on the occasion of the Prime Minister's visit appears to be this: Preserving the 1963 Indo-U.S. agreement for nuclear cooperation as the control framework, France

would supply enriched uranium fuel for the Tarapur reactors in place of the United States as the exclusive supplier. In the first place, it entails the continuation of external safeguards administered by the IAEA at Tarapur — on the reactors, on the spent fuel, and of course on the fuel to be supplied by the West European power. During the three rounds of negotiations on the subject in 1981 (in April, July and November), the Indian delegation headed by the Chairman of the Atomic Energy Commission, Dr. H. N. Sethna, took its stand on the basic position — embodied in Article VI of the 1963 agreement — that the acceptance of safeguards at Tarapur is conditional on (or in consideration of) the external fuel supply and that, once the latter condition is breached, "nothing survives". This position was developed in linkage with the longstanding principle — established during the time of Bhabha — that safeguards or restrictions on specific nuclear facilities or operations or material may be accepted, realistically, through mutual agreement between India and the external supplier, but strictly in return for external supply arrangements. The U.S. side was also informed that a top-level decision had been taken to run Tarapur on the mixed oxide (mox) fuel developed indigenously, and that there was full confidence in the technical and operational viability of the process. The new decision to let the U.S. continue in the role of a sleeping partner — who, however, is insistent on his rights surviving from the time he was an active participant — is a near-complete reversal of the basic negotiating position. Not only is the indigenously developed mox route (available only after a considerable investment) ruled out for the immediate future through this decision; a dent has been made in the fundamental nuclear energy stance that — as part of the refusal to accept the discriminatory global nuclear bargain — India will not accept externally instituted safeguards or restrictions on its nuclear activities except as a quid pro quo for external supply.

It might be argued from an official standpoint that, even if a concession has been made in the policy stance, in operational terms a new external source of fuel supply has been gained for Tarapur — that too, without treading on the corns of the ex-supplier. In that case, three kinds of questions must be answered. In the first place, if that was the "pragmatic" course, why was it not agreed to when the U.S. side pressed an alternative external source of fuel on India in the 1981 rounds and stubbornly opposed the mox route? (The technique of using the control framework of the 1963 agreement for facilitating a new external supply relationship was proposed secretly by the leader of the U.S. delegation, Mr. James Malone, on the eve of the third round of Tarapur talks in November 1981 — if only as a way to perpetuate IAEA safeguards.) Secondly, why has the non-supplier been allowed to get away with maintaining (publicly) that it can continue in effect to block the reprocessing of the spent fuel by not going through the exercise of "joint determination" of the safeguardability of the Tarapur reprocessing plant? Mrs. Gandhi herself has contested the U.S. position by asserting that "we have the right to reprocess" (under IAEA safeguards), but the point is that the U.S. has even backed out of its earlier negotiating offer to give up its objection to reprocessing as part of an overall settlement. Letting rival interpretations of the rights over reprocessing have it out cannot be treated as an academic or legal exercise — especially because the storage of the spent fuel poses a serious operational problem and could (unless tackled boldly in time) turn into a sensitive public issue. Finally, what exactly will be the terms and external restrictions asked for by France, in return for the low-enriched uranium fuel supplied? Will a "pursuit clause" be introduced, which means external safeguards chasing the derivative material to any facility (such as Kalpakkam) where it might be used? Will the new supplier demand a "veto" on reprocessing the fuel supplied, a right claimed as a matter of standard formula under the new nuclear suppliers' guidelines? The compromise on nuclear policy issues apart, the failure to answer these questions concretely seems to involve vacillation and uncertainty on the operational front. The general agreement — no doubt at variance with all that the nuclear scientists and technologists primarily involved might have been working for all these weeks and months — is thus a politically driven event. It would be interesting to see what precisely are the returns, in the political, economic or development field, for a major policy movement in this direction.

CSO: 5100/7136

OPPOSITION LEADERS SCORE TARAPUR AGREEMENT

Namboodiripad, Jethmalani Remarks

Calcutta THE STATESMAN in English 4 Aug 82 p 7

[Text] TRIVANDRUM, Aug. 3.—The general secretary of the CPI(M), Mr E. M. S. Namboodiripad, yesterday described as an "affront to the nation" the accord reached by Mrs Gandhi with President Reagan on nuclear fuel, providing for supply of enriched uranium from France, reports PTI.

Addressing a public meeting here, the CPI(M) leader said that Mrs Gandhi should have told the U.S. Government in no uncertain terms that "it was guilty of violating the agreement with India on nuclear fuel supplies". If the nuclear fuel was to come from France instead of from the USA, India should have entered into an agreement with France directly, Mr Namboodiripad asserted

Mr Namboodiripad also criticized what he called Mrs Gandhi's "complaints" to Mr Reagan that "the Communists are causing problems for her". This, Mr Namboodiripad said, was aimed at getting more U.S. aid to India.

One of the objectives of Mrs Gandhi's visit to the USA, the CPI(M) leader said, was for giving an assurance that India would abide by the terms and conditions of the loans sanctioned by the International Monetary Fund. This assurance, he said, in effect amounted to bartering away the country's economic independence.

The BJP vice-president, Mr Ram Jethmalani, claimed yesterday that Mrs Gandhi had not "achieved anything" during her U.S. visit, since the two main issues between the two countries—the U.S. arming of Pakistan and nuclear fuel for the Tarapur plant—had not been satisfactorily settled.

G. K. Reddy Report

Madras THE HINDU in English 4 Aug 82 p 9

[Text] NEW DELHI, Aug. 3.

The Opposition parties intend to press for a full statement in Parliament by the Prime Minister, Mrs. Indira Gandhi, before the conclusion of the current session on the agreement reached with the U.S. for the supply of substitute French fuel for the Tarapur nuclear power plant.

The Janata Leader, Dr. Subramaniam Swamy, who raised the issue during zero hour in the Lok Sabha today, wanted the External Affairs Minister, Mr. P. V. Narasimha Rao, to inform the House of what exactly had been agreed upon even before Mrs. Gandhi had returned to Delhi.

It is customary for the Prime Minister to make a statement on her return from a foreign visit, if Parliament happens to be in session. The statement is generally in the nature of a brief review of what had been achieved during such a visit, without going into the details of any particular aspect of it.

Reprocessing of spent fuel: So the Opposition parties want her to make a separate statement on the Tarapur accord explaining the scope and implications of the agreement in the context of the persisting differences between India and the U.S. over the reprocessing of the spent fuel accumulated at the Tarapur plant. They also propose to insist on an early opportunity to have a debate on the subject to ascertain why the Government had quietly reversed its policy after announcing in Parliament last year that all that remained to be done was to arrange a decent burial for what was then regarded as a dead agreement.

The Government went back on its earlier decision to abrogate the defunct fuel supply agreement in the name of keeping the country's options open until such time that it could not be subjected to any undue political pressures. But it gave the U.S. in the process enough time for manoeuvrability for keeping India irrevocably committed to the continuity of the safeguards by bringing France into the picture as an alternative supplier of enriched uranium within the framework of the 1963 agreement.

The Indian negotiators did not expect the U.S. to clinch this deal so soon. They thought that the Reagan Administration would like to handle it at a relatively lower level, without burdening the two heads of Government with the complexities of the problem, when they had many more important matters to discuss during their two-hour meeting in Washington.

Hurried approval: But as it so happened the senior State Department functionaries handling Mrs. Gandhi's visit presented a brief draft of the proposed accord at the very first meeting they had with the advance party of Indian officials who had been sent to prepare the ground for her talks with the U.S. President, Mr. Reagan. The draft was cabled to Delhi and, after hurriedly obtaining the French approval in principle, the Prime Minister consulted the Political Affairs Committee of the Cabinet a day before she left for Washington.

During the initial stages of the discussions between India and the U.S. on the possibilities of inducting a third country as a supplier of fuel within the framework of the 1963 agreement, the Chairman of the Atomic Energy Commission, Dr. H. N. Sethna, had occasion to sound his French counterpart on the nature of the safeguards that France would insist on in these circumstances. He got the impression that the French Government was going to be somewhat tough in its attitude, although at the political level the French diplomats led India to believe that the nature of safeguards was negotiable.

Safeguards on accord: The Government of India is now proceeding on the assumption, presumably with some degree of encouragement from the U.S., that France could be persuaded to provide the fuel in terms of the old safeguards without trying to update them. The assurances received from Paris so far speak of only acceptance of the new arrangement in principle, leaving the details to be settled at a later stage. It is difficult to anticipate what stand France would take if, for example, India decides to assert its right to reprocess the spent fuel at Tarapur ignoring the U.S. objections.

There will be a clearer indication of the French thinking and approach only after the Prime Minister and the External Affairs Minister have had a detailed discussion with the French Foreign Minister, Mr. Claude Cheysson. He is stopping over for two days in Delhi on his way back from China primarily to prepare for the French President Mr. Mitterrand's visit to India in November. The nuclear issue might become a test of the French readiness to accommodate the Indian point of view to the extent possible consistent with its own stand on non-proliferation.

CSO: 5100/7138

PAPER SAYS TARAPUR ARRANGEMENT NOT AN ACHIEVEMENT

Calcutta THE STATESMAN in English 5 Aug 82 p 8

[Editorial]

[Text] The new arrangement for the supply of enriched uranium fuel for the Tarapur nuclear power plant is being advertised as a major, if not the most important, result of Mrs Gandhi's visit to the United States. To describe it as an achievement is as misleading as its denunciation by some Indian politicians, of both the right and the left, as a sell-out. Ironically, a leading American newspaper described it as a "surrender" to India, but then it also pointed out that it was a surrender to necessity—so as to retain the safeguards which woud have lapsed if the Indo-U.S. agreement had been simply terminated. Indian critics of the new arrangement, under which the fuel will come from France, are mistaken if they believe that without continuing U.S. involvement the supplier would not have insisted on safeguards. Alleged clandestine supplies are a different matter but France or any other potential supplier would not have waived safeguards under a formal bilateral agreement. If India were really in a position to run the Tarapur reactors with an indigenously produced plutonium-uranium mixed oxide fuel, the question of safeguards would not have arisen and the 1963 treaty could have been terminated without hesitation

Perhaps Indian capability in this respect is not quite so advanced as claimed; perhaps unilateral termination of the treaty was considered inadvisable in the larger interests of Indo-U.S. relations. Whatever the consideration, the trilateral arrangement will be useful. But its value should not be exaggerated to make it look like a major contribution to India's economic or technological development. Besides, New Delhi has not extracted any concession from Washington. India did not violate the Tarapur treaty; the safeguards were scrupulously observed; no part of the safeguarded plant and materials was involved in the Pokharan explosion. It is the USA which went back on its treaty obligation to supply all the fuel needed to run the plant. That the safeguards will continue need not be resented, since India's objection has only been to extending their scope to cover all its nuclear facilities. But before the arrangement is finalized, New Delhi may have to resist attempts to impose somewhat wider safeguards than have been applied to Tarapur so far. More important, the technical hurdle to reprocessing the spent fuel will have to be removed; the plutonium to be extracted by reprocessing is demonstrably needed for fast breeder reactors, and possibly also to replace enriched uranium fuel for Tarapur. U.S. recognition of this need would be a much more positive gesture than any made so far.

CSO: 5100/7140

BRIEFS

NUCLEAR RESEARCH UNIT--BHOPAL--India[illegible] second nuclear research centre will be located in Bhopal. The first centre is functioning at Trombay. A team consisting of Mr. J. V. Pai, Joint Secretary, Ministry of Atomic Energy, and Dr. V. K. N. Iyengar and Mr. Amba Shankaran of the Bhabha Atomic Research Centre, Trombay visited Bhopal and approved three sites for the centre. [Madras THE HINDU in English 1 Aug 82 p 16]

HEAVY WATER SUPPLY--NEW DELHI, July 28--The requirements of the Madras atomic power station will be met by indigenous production of heavy water, including upgradation of low grade heavy water, the Lok Sabha was informed today. The newly completed first unit of the Madras power station needs 250 tonnes of heavy water to start its operations, Mr. C. P. N. Singh, Minister of State for Science and Technology, told Mr. K. Mallanna in a written reply. Mr. Singh said indigenous resources of natural uranium were adequate for the nuclear power programme currently envisaged. The total installed capacity of the atomic power stations in operation in the country was 860 MW. The enriched uranium sections of the nuclear fuel complex, Hyderabad, are likely to close down in the event of non-receipt of further supplies of enriched uranium, according to Mr. Singh. [Madras THE HINDU in English 29 Jul 82 p 7]

JAMATA LEADER OPPOSES TARAPUR AGREEMENT--NEW DELHI, Aug. 4--The Janata Party leader, Mr. Krishna Kant, has come out against the agreement reached between India and the U.S. on fuel supply to the Tarapur atomic power plant. Mr. Krishna Kant, described the agreement as "a steep climb-down by the Prime Minister" and a total reversal of the stand India had taken till now. Mr. Krishna Kant contended that refusal of the U.S. to provide fuel would relieve India of the corresponding obligations in respect of safeguards and nuclear waste. The Prime Minister had not implicitly and explicitly agreed to an amendment of the 1963 agreement and had bound the country to all the obligations under it in spite of the breach of the agreement by the U.S. He recalled that both the Soviet Union and France had directly offered to supply the requisite fuel for Tarapur but India had not accepted it. He also recalled the earlier statement by Indian officials that there was a limit to which India could go on accommodating and that the Government was answerable to public opinion. "The public opinion has obviously been ignored now in reaching the agreement." Mr. Krishna Kant also referred to the adverse effect the agreement would have on the efforts to use indigenously developed mixed oxide (MOX) fuel, and said, "under American advice Mrs. Gandhi had devalued Indian economy in 1966 and now she is devaluing Indian science and scientists." He wanted people and Parliament to be told about the compulstion swhich made the Prime Minister "to go against the advice of the Department of Atomic Energy and reverse the stand hitherto taken by the Government." [Text] [Madras THE HINDU in English 5 Aug 82 p 6]

CSO: 5100/7141

BRIEFS

VENKATARAMAN VIEWS NUCLEAR EFFORTS--According to reports Pakistan is known to be continuing its efforts both for uranium enrichment and spent fuel reprocessing capability which would enable her to detonate a nuclear device. This information was given by Defense Minister Venkataraman during question hour in the Rajya Sabha today. He said the government is keeping all developments impending on the country's security under constant watch for initiating appropriate measures to maintain defense preparedness. He also informed the house that there have been cases of violation of India's airspace by Pakistani aircraft during the last 2 and 1/2 years. [Text] [BK101123 Delhi Domestic Service in English 0830 GMT 10 Aug 82]

MUNIR CALLS FOR COOPERATION--ISLAMABAD, Aug 21--The Chairman, Pakistan Atomic Energy Commission, Mr. Munir Ahmed Khan, has stressed the need for cooperation among the developed and developing countries in the field of science and technology. Addressing the concluding session of the Seventh International Summer College on "Physics and Contemporary Needs" here on Thursday, Mr. Munir Ahmed Khan said the developed nations should not only extend monetary assistance to developing nations but also help them by sharing knowledge with a view to becoming self-sufficient in this vital field. The PAEC Chairman said by sharing knowledge they would help their counterparts in developing countries to do more research work and they will feel that they are also part of this knowledge. The Summer College was organised by Pakistan Atomic Energy Commission as a regular feature. More than 200 scientists from Pakistan and abroad participated in the college. He announced that the college will continue to be held in the years to come and the government has committed to support the activities of the college. He said President Zia-ul-Haq is keen in the activities of the college and he has pledged to patronise it. Mr. Munir Ahmed Khan thanked the lecturers and professors from abroad and said the college has concluded with very responsive conclusion. [Karachi DAWN in English 22 Aug 82 p 4]

CSO: 5100/5702

FRG MAY TRANSFER TECHNOLOGY TO MEXICO VIA NUCLEP

Rio de Janeiro GAZETA MERCANTIL in Portuguese 20 Jul 82 pp 1, 14

[Article by Paris correspondent Mario de Almeida]

> [Text] NUCLEBRAS Heavy Equipment, Inc (NUCLEP), which is already constructing the pressure chamber of the Atucha 2 plant in Argentina through a subcontract with the KWU [Kraftwerk Union], may, according to the firm's president, Ambassador Paulo Nogueira Baptista, and provided another subcontract is received, manufacture all the equipment of the reactor system produced by the German firm. The purpose would be to supply equipment to Mexico, if President Elect de la Madrid again takes up the country's nuclear program and if the KWU comes out the winner in the competition. Nogueira Baptista also asserted recently that, in agreeing to subcontract the work to a Latin American firm, specifically NUCLEP, the KWU should, in fact, have a greater opportunity than its competitors in Latin American countries. Yesterday, a spokesman for the firm told our editor in Rio that NUCLEP is at the point of establishing the conditions whereby it will supply the equipment after receiving the subcontracts.

A positive sign from the general headquarters of Miguel de la Madrid Hurtado, president-elect of Mexico, has stirred the interest of competitors for what is now the world's most disputed contract: The expansion of the nuclear-fueled thermoelectric power plants of that oil-exporting country with a budget estimated at $12 billion.

The forthcoming Mexican government advised the six bidders that it will choose the supplier from among that group as soon as President de la Madrid takes office at the end of the year. There are six organizations in the race: General Electric, Westinghouse and Combustion Engineering, from the United States; a Canadian Government consortium; FRAMATOME [Franco-American Atomic Construction Company], a French joint company; and Siemens, a German firm.

Each proposal submitted includes substantial financial provisions, which leads to the conclusion that the future Mexican administration will follow the same route as that taken by Brazil in the past 3 years--namely, associating contracts with suppliers of technology from the industrialized world at loans which help turn over the foreign debt.

There is also an important political aspect involved in the Mexican decision. The American competitors are depending upon the neighbor relationship between the two countries as the most weighty factor in the decision. The two European competitors are using the argument of the advantages of a diversification of sources of technological supply.

But Germany has a particular trump card in that competition. Its representative, the KWU, a former equal partner of Siemens with AEG Telefunken and now belonging totally to Siemens, can offer unequaled financial terms inasmuch as part of the equipment for the Mexican power plants would come from its associate, NUCLEP, a Brazilian firm established in the 1970's to produce parts for nuclear reactors.

The KWU is also willing to divulge its technology for a mechanism similar to that of the nuclear accord signed with Brazil 7 years ago.

The Mexican program is less controversial than the Brazilian, because it does not call for the development of the complete cycle of nuclear fuel.

The manufacture of reactor parts in Brazil is not much less costly than in the German parent company. The difference is in the financial arrangements. Since NUCLEP is a Brazilian firm, it is not subject to the protocol conditions which apply to 22 industrialized countries in the area of interest on exported equipment. That consensus establishes a maximum payback period of 8.5 years at a minimum interest rate of 10.75 percent for average countries like Mexico. NUCLEP could offer up to 15 years payback period at 8 percent interest.

The financial package of a negotiation of that magnitude contains shelters which could be exploited by aggressive countries such as France and even Canada. But in the overall picture, the advantage of a payback period with Brazilian credit would be unbeatable. By the end of this decade, when the Mexican power plants will be in the installation phase, NUCLEP could contribute 80 percent of the components of a KWU reactor.

Action of that type was foreseen since the beginning of the Brazilian nuclear program. An attempt to supply part of the components for the Atucha 2 power plant in Argentina has been under discussion for 2 years, and no definite decision has yet been reached. In the contract to be chosen by Mexico, the question of relations between countries of greater importance to Latin America will also have influence. Many Brazilian firms have discovered resistance from Mexican bureaucracy to the import of manufactured goods of a higher technological level.

That rivalry has been known to exist for decades on the American continent, although it is never mentioned in the multilateral meetings convened to overcome economic barriers. The change in Mexico City's government and also in the pragmatic style of the recently elected de la Madrid may help the proposal which includes Brazilian pieces. But no aspect will be as important as the financial conditions which, in the end, will be subject to payment by the Brazilian contributor.

8568
CSO: 5100/2237

CASTRO MADERO SPEAKS ON FUTURE OF NUCLEAR PROGRAM

Buenos Aires CONVICCION in Spanish 11 Jul 82 p 23

[Interview with CNEA Chairman Carlos Castro Madero by Julio Orione; date and place not specified]

[Text] The conflict with Great Britain prompted the need to make a thorough examination of the problems associated with the country's scientific and technical development. The evidence, this time clear to everyone, of the great gap that separates us from the more developed countries in critical areas (relating to peace as well as war) requires a study of positive and negative results. If we ask ourselves where there are positive results in Argentina in the technological realm, mention will no doubt be made of the National Atomic Energy Commission [CNEA], which has engaged in a vast effort for creation aimed at providing us with a nuclear policy of our own. CONVICCION interviewed Vice Adm (ret) Carlos Castro Madero, chairman of CNEA, to ask him for an analysis of the work accomplished and his thoughts on the need to intensify the formation of a national scientific and technical policy of a priority nature.

CNEA, a Model

[Question] Would it be valid to claim that CNEA could be a model for other technological and industrial areas in Argentina?

[Answer] With its shortcomings and mistakes, which are only natural, CNEA has shown a type of procedure that it is fitting to analyze. It is an institution which has sought its own generation of technology, taking two fundamental routes in that direction: On the one hand, the care that it took in training human resources in the various fields, seeking the highest level. Associated with this is the organization of an institute with a high international standing, in which nuclear physicists and engineers are trained: the Balseiro Institute. On the other hand, it was decided to demand a transfer of technology for the major contracts with foreign companies. The latter is a highly important point that I wish to stress: It would have been very useful for Argentina if the large-sized purchases made by the country in so many areas had always been accompanied by an investment (a very small one in comparison with the total amount, in all instances) allocated for research and development in those areas. Those two fundamental courses of action were supplemented in the nuclear field by the promotion of sectors that the native industry could contribute to achieve self-sufficiency. In all the contracting, an attempt was made to give native industry and engineering the status that befits them, so that they could follow up the nuclear development.

[Question] How were those determinations of Argentine nuclear policy arrived at?

[Answer] These courses of action selected by the Commission were a result of its having clearcut goals. And the essential aspect of this is that the personnel being trained have also been acquiring those common ideas that are always aimed at the same goal. This personnel is quite immunized against the changes that have occurred as a result of the different political vicissitudes which have taken place in the country. Thus, CNEA has become a strong institution, the leadership of which does not depend only on the name of the one heading it, but rather on the community of ideas among its members.

Solidarity

[Question] For some time, the Commission has had very active ties with other Latin American countries. What are the results of that cooperation?

[Answer] The conflict with Great Britain has demonstrated a great Latin American adherence to Argentina, and that has necessitated the country's enduring gratitude toward those nations. From the nuclear standpoint, Argentina's solidarity with the Latin American countries has been constant, from the beginning. Argentina has given and continues to give its cooperation to all the South American countries; it has made a genuine transfer of technology to Peru (developed technology and all its experience for guiding the Peruvian nuclear program). With Brazil, where there has been an excellent relationship in the nuclear field, the stress on the cooperation was one of the bases for the new relations with this country. I would remind you of the expression of solidarity shown by Argentina when the Brazilian nuclear plan was attacked by the United States; instead of assuming a selfish attitude of isolation and being pleased to see a potentially rival country attacked, on the contrary, it gave precedence to the sense of integration and brotherhood, and we lent all the support that we could to have that Brazilian nuclear plan carried out.

An Argentine Nuclear Submarine

[Question] Is the Argentine position toward the Non-Proliferation Treaty still in effect?

[Answer] Once again, in the light of the conflict, I can say that we have seen the wisdom of the decision not to sign the Non-Proliferation Treaty confirmed. First, because the NPT violates the principle of legal equality of all states, it is discriminatory; second, because it does not offer protection against the nuclear powers, which was confirmed by events, with the sending of nuclear submarines by Great Britain. If Argentina had signed the treaty, that action on the part of Great Britain would not have been avoided. If this were the case, we would have had serious problems in our technological development, owing to the limitations in the NPT, and we would not have any benefit when another nation used nuclear power for military purposes.

[Question] What are the grounds for the possible construction of an Argentine nuclear submarine?

[Answer] Argentina had a great shock when it found that no one spoke up to condemn the use of nuclear power for military purposes by the powers that head the policy of non-proliferation, one of its leaders. Under those circumstances, we realized that the world apparently considers the use of nuclear submarines to be lawful. Therefore, the country cannot accept being at an obvious disadvantage in defending its sovereignty. So, it has decided not to limit itself in the future to those so-called "non-prohibited" uses of nuclear power; and for this purpose we have begun a study that will determine the feasibility, the cost and the time required for achieving the national development of a nuclear submarine. This feasibility study will take a year or more and, at that time, it will be submitted to the national government, which will decide whether its construction is fitting.

The Nuclear Plan and the Economic Policy

[Question] What damage did the Argentine Nuclear Plan suffer as a result of the economic policy of the past few years?

[Answer] The Nuclear Plan has received constant backing from the national government and from the economic authorities, of course, with limitations on the distribution of funds to the various sectors. One of the problems that has upset the progress of the Nuclear Plan is the financing system for the plan, whereby only a small portion is a contribution from the Treasury funds, and the largest portion depends on internal and external loans. Carrying out a plan of this importance with short-term loans is a very difficult task. On occasion, the necessary loans are not available at the proper time, and this is often reflected in the inability to pay promptly and in the resultant costs for delays and interest on debts.

[Answer] What is the current status of the projects in the plan?

[Answer] The pace has been geared to the opportunities afforded by the budget. The progress has not been halted, but the projects are continuing at a slower pace. This will prevent the heavy water plan from going into operation in early 1984; it will perhaps do so toward the end of that year. The Atucha II Nuclear Powerplant will be delayed between a year and a year and a half; and the other projects (reprocessing plant, pilot heavy water plant, uranium dioxide production plant and others) have been delayed, because the necessary funds were not available at the proper time. The future is not very promising, because an adjustment of the budget is required (the budget was prepared with guidelines wherein the value of the money was that of December 1981), and the process of preparing the budgetary readjustment will cause further lags.

2909
CSO: 5100/2243

NUCLEAR PLAN CONTINGENT ON EXTERNAL PRESSURES, BUDGET CUTS

Buenos Aires ENERGEIA in Spanish No 26, Jul 82 p 617

[Article by Martin F. Yriart: "Nuclear Plan: Pressures, Budgets and Politicization"]

[Text] The political context of the "transition" on 1 July does not allow one to make any predictions. Rather, it forces one to put a question mark behind any government action planned for the future, particularly programs whose scheduling extends beyond 1984.

Nevertheless, three factors seem destined to have a clear influence on the course followed by the Nuclear Plan in the near future: external pressures, budget restrictions and the human resources available. Obviously, none of the three strictly depends on the Nuclear Plan itself, but rather, on the conditions under which it is carried out, even though the prestige of the CNEA [National Atomic Energy Commission] and the domestic and international political value of its accomplishments have been shrewdly used in the past to handle difficult situations and, at times of a general slump in the country, to provide -- at least for a time -- the means and conditions required in order to carry on with nuclear projects.

On the first of these fronts: external pressures, CNEA circles predict a reoccurrence of the situation that arose in 1979 with respect to the awarding of the Atucha II nuclear power plant and the Arroyito industrial heavy water plant. First of all, as long as the situation caused by the conflict in the Malvinas is not cleared up once and for all in favor of one side or the other, the countries that sided against Argentina and applied economic sanctions (Great Britain, the United States and the EEC) will remain mobilized and, while some have formally lifted sanctions, they will not fail to use the means at hand to continue to exert pressure on Argentina, trying to break up the internal front.

However, the incentive of the situation created by the conflict in the Antarctic is now joined by the attitude adopted by Argentina in June, announcing before the Board of Governors of the International Atomic Energy Agency that if the IAEA does not rule against the use of nuclear submarines by Great Britain, Argentina would interpret that use of nuclear energy as not "outlawed" and conclude that it also has the right to use it. Upon his return from Vienna, the head of the CNEA, Dr Carlos Castro Madero, confirmed in various articles in the press that in his opinion, Argentina was capable of initiating the development of nuclear submarines, although he did not specify the time and phases of execution or the material and human resources that such a project would require.

Nevertheless, his statements in Vienna reportedly caused considerable concern among nuclear powers and led him to predict, a few days ago, that this would be one more reason to step up external pressure on independent Argentine nuclear development.

The success of such pressure is to a great extent related to the second front of problems: budget difficulties. It is difficult to imagine how the Argentine economy would manage major recovery in the near future. The weakness of the Argentine peso, caught between the devaluation and the foreign debt, leads one to think that the harsh budgetary restrictions adopted at the beginning of the year will not be adequate and that as a result of inflation or postponements, the budget assigned to the Nuclear Plan will once again be reduced, without any prospect of significant compensation during the next fiscal year at least.

The degree of self-sufficiency achieved and above all, that which will be necessary to achieve and consolidate in the immediate future in order to meet outside pressures, will require new investments. It is difficult to see how the private sector could make a large capital contribution to such investments, given the peculiar characteristics of the domestic and international nuclear market. Experience shows that to date, private participation has been achieved to the extent that the government offered a series of promotional measures aimed at reducing the capital risk, providing technology and assisting in the startup of new investments.

The third factor, human resources, is also related to the budget, but it has another aspect with the process of the political "thaw" ahead. The economic aspect does not merely mean the remuneration of research workers and technicians, a subject already sufficiently debated in the past, but also the availability of adequate means for research and development work, meaning the existence of programs and projects in keeping with original plans. In addition, there is the effect of the "politicization" of the general atmosphere in the country. One of the questions posed by the transition has to do with the continuation in the future of the climate of calm that has reigned in the CNEA over the past six years and that some worriedly compare with the agitation prevailing during the preceding period.

In the meantime, the conflict in the Malvinas has once again emphasized the accuracy of the policy of technological self-sufficiency adopted by Argentina in the nuclear field, now in the form of technological support for the Armed Forces from CNEA experts. What was a natural reaction to the aggression of which the country was a victim and which the short duration of the conflict prevented from developing adequately is now becoming a consolidated, long-range activity, thus strengthening CNEA resources in the countless technological disciplines it involves.

11,464
CSO: 5100/2236

BRIEFS

NUCLEAR FUSION VIABILITY--Sao Jose dos Campos--The scientific viability of nuclear fusion is to be shown during the next 5 years by a team of scientists from the National Space Research Institute [INPE[in Sao Jose dos Campos, coordinated by physicist Daniel Noddmann with the participation of researchers from the universities of Campinas and Sao Paulo. Once that viability is ascertained, that is, when the process of nuclear fusion begins to produce more energy than what is consumed, the Ministry of Mines and Energy will establish a national center for nuclear fusion, with headquarters in Rio de Janeiro, to coordinate all research in that field and pursue the idea of making the project economically viable, which is aimed at the creation of a new technology for the production of electrical energy in Brazil. Nelson de Jesus Parada, director of the INPE, said that those projects are part of the national physics program for high-density plasmas and energy. The process being developed consists in discharging a quantity of uranium and thorium, creating a fusion and a magnetic or inertial confinement to avoid an implosion of the material and control the production of energy. The INPE, which will have existed 21 years this Tuesday, is declining comment on this subject, along with certain military institutions which are participating in similar research. Meanwhile, it is known that the INPE is already able to reprocess uranium and that, in addition to the production of electrical energy, the team coordinated by physicist Daniel Noddmann is also researching ways to use atomic energy in the propulsion systems of satellites. These systems are employed in the movement of the satellite to raise it to a specific orbit or to correct its trajectory, maneuvers which cannot be performed by the launched rocket itself. [Excerpts] [Rio de Janeiro O GLOBO in Portuguese 2 Aug 82 p 14] 8568

NUCLEAR OPPOSITION IN PARAIBA--The Executive Committee for Integrated Studies of the Hydrographic Basin of the Paraiba do Sul River (CEEIVAP) is studying the possibility of restricting the installation of nuclear power plants and plants for reprocessing nuclear fuels in that water basin to preserve the quality of the water. Certain technical sectors of the committee displayed strong opposition to NUCLEBRAS [Brazilian Nuclear Corporations] which, 3 years ago, began the construction of a uranium reprocessing plant--namely, the Angra dos Reis plant--alongside the Funil Dam, in Itatiaia, municipality of Resende. The dangers this project represents for the principal source of drinkable water for metropolitan Rio will be discussed at a seminar on the "Declaration of Rights of the Paraiba River," to be held on 3 and 4 August at the auditorium of the Federal Savings Bank under the auspices

O GLOBO and Light. A CEEIVAP construction group drew up a plan for macrozoning the Paraiba River basin, indicating places suitable for urban expansion, the installation of industries, agropastoral use, forest reserves, and so on. The group recommended that a ban be placed, throughout the basin area and as far as Campos, on the installation of industries which contain nondegradable substances with a high level of toxicity in their final effluents. The same recommendation applies to the installation of industries of the chlorosoda type with mercury cells and industries manufacturing organochlorinated pesticides. Factories of this type already exist in Resende and Barra Mansa, such as Cyanamid and Du Pont. Another restrictive measure put out by the committee applies to the installation of industries which market proven carcinogenic substances taken orally, in accordance with publications put out by the International Center for Cancer Research, in Lyon, France, and with the International Registry of Potentially Toxic Chemical Products, of Geneva, Switzerland. The technicians also made recommendations with regard to the use of agricultural and cattle-raising land, the preservation of the vegetation and mineral extraction. [Excerpts] [Rio de Janeiro O GLOBO in Portuguese 27 Jul 82 p 9] 8568

CSO: 5100/2237

BRIEFS

URANIUM EXPLORATION--THE French company, COGEMA, which has in the past three years been exploring for uranium in Guyana is now engaged in exploration drilling in the Mazaruni. A senior Geology and Mines official explained that the drilling exercise is intended to determine the existence of the uranium deposits. Basic geo-chemical work and aerial and ground radiation test have already been done in this exploration area. Uranium, a nuclear fuel, is sometimes present near the surface, enabling surface mining but can also be found at considerable depths, requiring drilling. COGEMA, which is wholly owned by the French Atomic Energy Authority, has been working in Guyana since 1979. [Georgetown GUYANA CHRONICLE in English 13 Aug 82 p 1]

CSO: 5100/7548

MISMANAGEMENT AT NUCLEAR ORGANIZATION

Cairo AL-'UMMAL in Arabic 10 May 82 p 3

[Text] What is going on in the Agency of Nuclear Elements?

This question still has to be answered, but the answer is alsready becoming clear. There are documents that say there are piles of irregularities and illegal acts taking place inside the agency.

There are buildings that were erected then left to house the beasts of the desert, instead of being used by the agency. There are equipment that were imported for millions of pounds then laid to rest in warehouses.

A Union Suspension:

Becuase the union committee in the agency is totally concerned with putting public funds to good use, it has submitted memos and complaints to the Minister of Industry Mr Fu'ad Abu Zaghlah, urging him to investigate these occurences.... But this did not please Dr Mustafa al-Ayuti, the director of the agency, so he issued Act No 148 of the year 1982, dated 4 May 1982, whereby he ordered the suspension of 'Abd al-Basar 'Abd al-Azim 'Abdul Fattah, who for the agency, for three months, without considering his union position.

Mr 'Abdul-Fatah is the secretary general of the Union Committee for the Workers of the Agency. In doing so Mr al-Ayuti acted in complete disregard of union laws, namely Law No 35 for the year 1976, amended by Law No 1 for the year 1981. This took place because said union official "dared" to notify the minister of industry, out of concern for the wasted public funds in the agency, about the illegalities taking place there.

Nor was the director of the agency satisfied with this; he ordered, in the same decree, that half the salary of Mr 'Abdal-Fatah be suspended starting with the date of the suspension of his job.

Minister of Industry Takes Honest Stand

In view of all the facts mentioned in the memo of the Union Committee for the Workers of the Agency, presented to the minister of industry, Mr Abu Zaghlah ordered the establishment of an investigating committee to study the allegations made in the memo. Accordingly Mr Ahmad Kamal Salim, the legal advisor to the minister of industry, sent a letter to Muhammad 'Abdal-Nabi al-Madawi, head of the Union Committee of the Agency. The letter, No 12-123, and dated 2 May 1982, explained that considering the agreement to establish a committee in the Ministry of Industry and Minerals to investigate the conditions of the Agency, an agreement that was reached in a meeting of the minister of industry with the members of the Union Committee, it was also agreed to postpone the meeting of the general assembly of the Union Committee, originally scheduled for 3 May, till after the investigative committee had finished its study.

AL-UMMAL, with its concern for public funds that are in fact the property of the people, and considering that it is the newspaper that expresses the voice of the toiling class which is in fact the proprietor of these funds, feels it necessary to expose in all frankness, and through the doucments of which it is in possession, a number of events that are taking place inside the Agency. We hope to enlighten the investigation carried out by the Ministry of Industry in this respect. We will relate the story from the beginning.

One chapter of the story is related by Mr Fu'ad Darahim, secretary general of the General Union of Mineral Workers and Stonecutters. According to him the Agency was previously run by one of Egypt's most eminent scientists, Dr Shazli Muhammad Shazli. When he assumed the job of director of the Agency he sought hard to turn science into a tool that serves production. Therefore he established productive projects, like the pilot uranium mines, the black sands factory in Rashid, and other vital projects in this field. These projects were meant to exploit the results of scientific research for the purpose of actual production. Foreign companies began to invest in these projects, including Canadian firms, among others.

A University Auditorium

But there was a group of scientists that wanted science for the sake of science, and considered the agency part of the university--and a step towards gaining academic degrees--in order that they may sell their experiences abroad. These scientists formed a front to oppose production.

They adopted the principle that the Agency of Nuclear Elements was a scientific agency. They launched a disagreement with Dr Shazli, the director of the agency, and gradually expanded the friction into other areas, like creating tension between the workers and the scientists. They then raised the issue of the democratic practices of the administration of the Agency, and incited some scientists in the Agency.

At the same time there was a sharp conflict, for reasons that had nothing to do with this controversy, between Dr Shazli and Mr Taha Zaki, the former minister of industry, who was trying to revoke the decision to establish the agency, so that he would have the chance to establish a board of directors that he would preside upon. His attempts, however, came to nothing after the State Council twice opposed him due to the illegality of the act.

The campaign of the scientists would not have succeeded had Mr Taha Zaki not intervened. He relieved Dr Shazli of his post and requested that Dr Mustafa al-Ayuti be delegated to head the Agency.

The victims were the workers and the production. But let us now turn to the fate of the agency after the departure of Dr Shazli.

The Story of the Qatmiyyah Headquarters

Instead of investing the funds spent by the agency in erecting buildings, buying equipment and the like, the agency, and for no logical reason, turned away from all this. One can even say that what is now taking place in the agency's headquarters in Qatmiyyah is a dangerous precedent. After the agency obtained a plot of 150 fedans the Qatmiyyah area, prefabricated buildings were imported from Sweden, special construction works and additions built into the main headquarters for administration as well as four other buildings and a workshop, the costs of which exceeded half a million pounds, in addition to erecting a wall, opening pavements inside the plot that cost 150,000 pounds, building four security towers, a security building, a cafeteria and sidewalks, all of which cost some 90,000 pounds, besides purchasing equipment to provide 412 kilowatts of electricity for the building at a cost of 93,000 pounds, and other equipment as a reserve source of electricity for the computer, with a cost of 42,000 pounds, the project was abandoned. Stranger still, abandoning the agency's buildings in the Qatmiyyah site which had cost so much will prevent the operation of the computer that was purchased from the Research Center of Scientific and Statistical Computers in the Cairo University, at a cost of approximately 200,000 pounds, whereas the agency has already bought all the necessary equipment to operate the computer in Qatmiyyah, also from said center and from E.A. C. L. at a cost of about 15,000 pounds, and prepared an industrial site for the equipment at a cost of 10,000 pounds. An air conditioning unit for the computer building was also bought at the cost of 30,000 pounds, All this is added to the monthly maintenance cost for the upkeep of the computer, which runs at the rate of 3,000 pounds a month paid to E.A. C. L. Co.

They Are Looking for Another Site

After the expenses of the establishment of the Qatmiyyah site had exceeded one million pounds, the scientists at the agency came up with a new idea: Abandoning the Qatmiyyah site and moving to Inshas in the Sharqiyyah Province, where the headquarters of the Agency of Nuclear Energy already exist. All this in spite of the fact that the Agency affiliated to the Ministry of Industry, and attached to its mines along the coast of the Red Sea, its Monazite and Zircon factory in Rashid and its exploration missions in the desert, whereas the Agency of Nuclear Energy is affiliated to the Ministry of Electricity and Energy, and is naturally situated in Inshas because that site is close to the nuclear reactor there. So what is the connection then between the two agencies?

One must also remember that the transfer will incur upon the workers of the Agency of Nuclear Elements additional expenses for relocation.

Story of the Miskat Mine

These were not all the irregularities committed. Furthermore, there is a pilot mine in the area of Miskat and al-'Aradiyah. A committee was established from outside the Agency of Nuclear Elements to evaluate the mining activities in the area, in spite of the efforts and funds spent over studies, research projects and academic theses conducted by the scientists of the Agency over a period of a quarter century. Besides, the report of the committee was never published, so it was never known if Uranium was in fact discovered in the area, and if it was not then this would perhaps mean all the studies will have to be started anew. In this context the whole effort would have been nothing more than mere practice and a training field, when it had cost over 2.5 million pounds.

Furthermore, no steps have yet been taken to purchase the factory that was decided to be established in the mines area to extract and refine crude uranium, the blueprints for which are found in the Canadian report, for which the Agency of Nuclear Elements had paid about 52,000 pounds to the Melbourne Co in Canada.

And the Story of the Monazite Factory

What happened to the Agency's headquarters in Qatmiyyah is now happening to the Monazite and Zircon factory in Rashid, despite the fact that the latest equipment were purchased for the factory, at a cost of over half a million pounds. This equipment has been waiting in the warehouses of the Agency's site in Qatmiyyah since May 1981. A road was also built to connect the factory to the Rasheed public highway, at a cost of 18,000 pounds, in addition to the purchase of a large electricity generator that cost 93,000 pounds, and the erection of three administrative buildings and a workshop that cost some 282,000 pounds.

Strangely enough, the administration of the Agency halted the erection of the prefabricated buildings designated for the factory, while work is now going on to establish these buildings on the site of the Agency of Nuclear Energy in Inshas.

Finally, The Budget

The administration of the agency was not satisfied with all this trouble and the funds it wasted starting projects which it did not put to use later. It even started manipulating the funds that come under the third item in the budget of the agency, and which presumably were allocated for investment projects. These funds exceed 3 million pounds. The administration, in its purchasing operations, concentrated on requesting equipment, chemicals and glass containers for the workshop, of the same type with which the Agency's warehouses and workshops in Inshas are overflowing. These funds were requested in the budget of the Agency and allocated to provide for the expenses of its basic projects. But the administration now is not paying any attention to these basic projects, as indicated by the establishment of a committee for purchases that does not include a single person who works in the Agency's basic projects: the mine and the factory.

In the end, AL-UMMAL wants to reveal these irregularities that have led to the mismanagement of public funds in a wasteful way. We are laying the facts before the Minister of Industry to protect public funds from this phenomenon of irresponsibility in the Agency of Nuclear Elements.

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CSO: 5100/5008

TAIWAN NUCLEAR CUTBACK BAD NEWS FOR SOUTH AFRICA

Johannesburg RAND DAILY MAIL in English 11 Aug 82 p 14

[Article by Adam Payne]

[Text]

SINCE South Africa is a supplier of uranium oxide to Taiwan Power, the news of cutbacks in Taiwan's nuclear programme is significant for South African uranium producers.

The Taiwan Economics Ministry has formally instructed the State-owned utility to defer plans to build its seventh and eighth nuclear units.

Mr L K Chen, chairman of Taipower, commented: "It's a pity because we had to give up some very favourable terms that we may not see again."

The project to build these two units is unlikely to be revived for two or three years.

The postponement decision was made by the ministry after a review of Taiwan's slowing economic growth and declining power consumption, reports Nucleonics Week, published by McGraw-Hill in New York.

Rather than the originally targetted 7,5% growth rate for 1982 and succeeding years in the 1980s, Taiwan is now expected to achieve a 4% rate this year at best and officials seem doubtful that the previous momentum can be regained rapidly thereafter.

Demand for power fell by 1,6% in 1981 — the first drop in more than 30 years — and fell another 0,9% in the first half of this year.

Up until the final ruling by the Economics Ministry, Taipower executives continue to argue in favour of maintaining the project on schedule — with unit 7 to be completed in 1991 and unit 8 a year later. In a conversation with Nucleonics Week, Taipower's Mr Chen outlined the main points he had made to the Government:

● Even if demand for power is less than previously forecast, the plants could be used to substitute for oil-fired plants in the Taipower system. Savings in the national oil bill would be enough to cover interest costs for the nuclear project, he said.

● An interruption in the construction schedule after units 5 and 6 are completed in the next few years could pose a burden for the utility. "We would probably have to lay off several thousand workers, and when we resume the project we don't know if we'd be able to get them back."

In rejecting the utility's arguments, the ministry said it was looking not only at current recession-induced economic conditions but also at projections for slower growth in power demand in the future, as Taiwan's industrial structure shifts. The industries now being encouraged for future development, such as electronics and machinery, are not heavy consumers of power.

A few years ago, Taipower's schedule called for 20 nuclear plants to be operational before the end of this century. Recently the number was cut back to 14. Now, with the postponement of units 7 and 8, it is doubtful that more than 11 plants could be completed before the year 2000, said Mr Chen.

He added that Taipower and the government would review the scheduling for the two deferred plants again a year from now, but that the two-year to three-year delay was expected to stand unless projections for annual growth in power demand for the coming decade rose well above the 5-6% now expected.

CSO: 5100/5701

CLANDESTINE ANTI-NUCLEAR GROUPS FIGHT CHOOZ PLANT

Paris LE MONDE in French 31 Jul 82 pp 1, 19

[Article by our special correspondent Danielle Rouard: "Demonstrations by Steel Workers and Environmentalists: The 'Desperados' of the Ardennes"]

> [Text] Charleville-Mezieres--At the Chiers plant, a subsidiary of Usinor, in Vireux-Molhain (Ardennes) threatened with closing by the restructuring of the French steel industry, the inter-union FO [Workers Force]-CFDT [French Democratic Confederation of Labor]-CGC [Confederation of Managerial Personnel] has increased its activities since the beginning of the year. The CGT [General Confederation of Labor], which is the majority union, has taken numerous steps with the management of Usinor and the administration likewise, clandestine groups under the sign V.V. (Vireux vivra [Vireux will live]) have claimed various operations that are increasingly violent.
>
> In an establishment committee meeting held in Paris 28 July, management has just announced the opening of negotiations in September. On 31 July at Chooz, located four kilometers from Vireux-Molhain, V.V. and the Franco-Belgian Action Front, a clandestine anti-nuclear movement, are calling for a demonstration against the construction of a second nuclear power plant on the site. What does this common initiative between steel workers and anti-nuclear supports at Vireux-Molhain represent?

Vireux--"We are not anti-nuclear by idealism but by necessity. What is the big deal with nuclear? But opposing the construction of the second power plant at Chooz is the greatest means of pressure that we have against the government and the administration to make them take us seriously." This steel worker at the Chiers plant, after more than twenty years in the plant, remains a moderate for whom violent action is a timely necessity and not a "vocation." There are many among the eight hundred twenty-seven employees of the firm that think the same. Under the banner of the inter-union FO-CFDT-CGC, they are defending their jobs, ready for everything. Since the creation of the first

Chooz power plant 4 kilometers from Vireux-Molhain, where Chiers is located, factory closings have increased. The slogan "Nuclear equals wilderness" has made strikes in public opinion. The construction of a second power plant will only make the job situation more serious. "[There are] few jobs for Vireux residents and that's not all. Unskilled digging labor for steel workers," they are saying around here.

Occupations of the Charleville-Mezieres train station and of bank agencies, holding the firm's managerial personnel, stealing the ballot boxes during the first round of the cantonal elections, demonstrations with the Chooz anti-nukes, battles with the police whose helicopter even caught several bullets. In sum, for the past seven months, the Chiers steel workers and the Vireux-Molhain population have lived under the fires of resistance. The La Buchere castle, residence of the president of Usinor, of which Chiers is a subsidiary, now has burned walls. On 12 July three hundred [illegible]ire. Some steel workers who were furious about [illegible] up by management officials that they were expecting [illegible]anned meeting set the fire.

In the plant, some are resolutely hostile to this state of affairs but prudently keep quiet. "We don't want to get a bullet in the back," they tell us. A very convinced minority has been leading the struggle since last Christmas. Its success is due to the fears that it can inspire--management officials of the firm have evacuated their families for safety reasons--but also to the obviousness of its objectives and the effectiveness of its means.

Last December. The closing of the Chiers factory is confirmed. The inter-union is formed, without the CGT which is, however, the majority union in the plant. The latter considers that it has not been consulted by the unions. It is skeptical of those who took the initiative for the "inter" as they call it here. Among them, a former CGT delegate who set up the FO section several years ago.

Finally, the CGT prefers to negotiate the fate of Vireux at the highest level, with Usinor and with the government. The leaders of the inter-union analyze things differently. At first they present an industrial project making the survival of Chiers at Vireux possible. The plant would become an experimental field for advanced technologies, "an industrial risk to be taken with the help of the administration." This project was not considered.

Then the "inter" presented a social project guaranteeing the employment contract of the current employees for ten years. The legal entity of the firm would be maintained, with Usinor's guaranty, while new activities were being sought.

But how were they to be taken seriously?

The Givet point, this valley which goes through the splendid Ardenne forests, knows that it is ignored by the rest of France. Three hundred thousand inhabitants in a department which holds one of the unemployment records "has no weight in the elections," it is explained. EDF [French Electric Company] officials chose to build the largest nuclear plant in Europe here. It has a power of four times 1,300 megawatts, is seventeen times more powerful than the current power plant. The Chooz site was selected because of the low population density, they tell you here.

Just Like Asterix

Desertion has become an obsession here. "When we feel small compared to the government, to EDF, to the large trusts, the only weapon is to get into spectacular activities which make the front page of the newspapers," explains one of the "inter" founders. "Vireux, a small lost Gallic village, like Asterix," he explains sardonically. [Trans. note: Asterix is a popular comic strip character in France who single-handedly opposes the occupying Roman army in Gaul.]

They meant what they said. But how far would they venture into illegal activities? Differences of opinion on this point were not long in surfacing.

"The union organization can, in no case, support actions like burning the castle. You have to set limits," declares a CFDT official of the "inter" who is also secretary of the departmental CFDT metallurgists union. According to him, the time has come for negotiating "within the unions and not short-circuiting them."

But, "Lots of folks around here no longer believe in parties or unions. The only thing that counts is defending their jobs," says Franz Hubert, a Chiers employee for twenty-seven years, FO delegate after breaking with the CGT. This uncontested leader of the "inter" and a cheerful character to boot expresses a broadly shared viewpoint. The national leadership of FO has sent him several reprimands.

Andre Bergeron, during the forty-eight hour sequestration of three Chiers officials, sent him a telegram telling him to end that action which was "incompatible" with union responsibility.

Other members of the "inter," affiliated with the CGC, have had similar experiences. As for the CGT, which is absent from the "inter," its membership is divided. Because of that, it has participated in several "inter" actions, such as the march on Paris.

Clandestine Groups

Behind the disagreements on the means of actions, the problem of union power has arisen since Christmas. In February a clandestine group that attacked the tax collection office at Fumay, near Vireux, with explosives appeared. The action was signed V.V., a sign that was to be found again a little later after demonstrations under the slogan "Vireux will live" and even on t-shirts sold in town. Who is V.V.? Obviously everyone here has his theory. Everyone or nearly everyone knows each other here. But its another matter when it comes to certainty, and especially to expressing it aloud.

From February to the end of July V.V. signed increasingly serious actions. The T.V. relay at Revin was disconnected, the EDF garage attacked. In Givet it was the T.V. relay and the tax office; in Montherme, in Nouzonville, in Charleville, trees cut down; in Aubrives, a volley of explosives over the quarry; in Foisches, a high voltage pylon was attacked with explosives. This last operation, which was delicate but successful, makes some Vireux inhabitants say that there is perhaps an "anti-nuke hand" in the business.

In fact, for the past three years there has been an "Ardenne Common Front," including environmental associations, anti-nukes, the PSU [Unified Socialist Party], and the PS [Socialist Party], which got out right away, against the construction of the Chooz nuclear power plant. A rare fact: on the Givet point, a great majority of the anti-nukes are working class people born in that area. But after 10 May, explains one of the founders of the Franco-Belgian Action Front which is clandestine and anti-nuclear, created after 10 May, "Those of us who had voted for the Socialists got the picture. Now we will fight to the bitter end."

This front, structured in autonomous groups, under the direction of a collective group which sets the objectives of the action, has demonstrated unrelentingly with increasingly tough actions.

Is it a sign of the times? The inter-union was quickly bypassed by the groups, V.V. and others such as the "Disgusted" or "Conscious Workers"--a cloud of clandestine names behind which are groups of folks who judge that the union banner is ineffective against the measures closing factories. On 31 July the usual end of the month demonstration by the Chooz anti-nukes was, for the first time, called by the Franco-Belgian Action Front and the V.V., that is, by clandestine groups.

For their part, officials of the plant have just partially accepted the "inter" social project. "One success which shows that the "inter" was on the right track," says one of its members. The meeting of the establishment committee with all of the union organizations was also positive for those whose priority is action within a union framework.

A meeting was set for September when the French steel plan has been definitively decided upon. "But that is no reason to let up on the pressure," say certain people at Chiers who are getting ready to act along side of the anti-nukes on 31 July.

9969
CSO: 5100/2234

CLANDESTINE ANTI-NUCLEAR 'VIREUX VIVRA' ORGANIZER

Paris LE MONDE in French 31 Jul 82 p 19

[Interview with unnamed organizer of "Vireux vivra:" "To Defend Vireux"; date and place not specified]

[Text] [Question] We asked one of the V.V. organizers how this movement was created.

[Answer] The first action signed by V.V. was the attack of the Fumey tax office in March. As early as December it was clear that the condemnation of Chiers has been pronounced. The traditional union struggle had been exceeded. For the problem of Vireux as elsewhere, striking is an outmoded weapon, like a WWI carbine against ground-to-air missiles. There was no question of having the workers loose money for nothing. We had to get right down to brass tacks. And sign. The tax office action, carried out by a small number, was a warning to the administrations and to the political power. That was a surprise for everyone. Then other actions followed, crescendo.

We are not kamikazes. We want to go as far as possible, but in a thoughtful way. We refuse to give in but we evaluate the risks. The rule in this field is 50-50. We select the objectives of our actions as a function of past or future negotiations. We are against gratuituous violence.

[Question] What are the objectives of the movement?

[Answer] Since the beginning, to defend Vireux. And now, perhaps go beyond the borders of Vireux, to the departmental level. Knowing where we are going, as we have known until now. Causing material damages is not serious. But, for us, human life is the most precious possession.

[Question] How are you organized? How many of you are there in the V.V.?

[Answer] There are several dozen of us. V.V. got started quickly with a few very determined buddies. Each one evaluates what the person he brings in is worth, what he thinks. No backing out. Discretion, determination, availability are the qualities required for recruitment. Any breach provokes exclusion. You have to use your muscle, but also your head.

Each group acts on one action, in a compartmentalized way. The groups do not know each other. A small group instigates V.V. action. There is no real hierarchy. As for the equipment, up until now we have always managed to find some.

[Question] In the eyes of public opinion, are you assuming a role of terrorists, as some say?

[Answer] In fact, we are men who defend ourselves, who redress wrongs, of all political and union tendencies. We do not make these tendencies a criterion for recruitment, but we are careful to avoid any confusion. As for the risks of being over-run, we are aware of them. Until now we have succeeded in overseeing everything we have done. In no case do we want to create headquarters for violent action.

9969
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END

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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 162

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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17 September 1982

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 162

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BRIEFS

INDIA'S OFFER OF NUCLEAR COOPERATION--India has offered to assist Iran in the development of nuclear energy. Commerce Minister Shivraj Patil, currently in Tehran, discussed Indo-Iranian cooperation in the field with the chief of the Atomic Energy Organization of Iran Reza Amrollahi. The talks covered training courses for Iranian technicians at Indian nuclear centers. Tehran also sought Indian expertise to complete her power plant at Bushehr. Patil also met the speaker of the Iranian parliament, Rafsanjani, and discussed with him bilateral matters. Rafsanjani told him that Iran wants India to play a greater role in our foreign economic relations. [Text] [BK270950 Delhi Domestic Service in English 0830 GMT 27 Aug 82]

CSO: 5100/2246

PRC APPROVES NUCLEAR VENTURE WITH HONG KONG

NK200200 Hong Kong SOUTH CHINA MORNING POST in English 20 Aug 82 p 1

[Text] Beijing has approved the construction of a nuclear power plant in Guangdong which will supply electricity to Hong Kong, a vice-governor of the province said yesterday,

Reports reaching Hong Kong said Mr Liang Weilin revealed that the project would go ahead after a meeting between top Guangdong officials and the Hong Kong governor, Sir Edward Youde, who is on a two-day official visit in Guangzhou and Shenzhen.

Speaking to reporters after the meeting, Mr Liang said the governor was told of the decision when he asked if Canton had enough electricity.

Sir Edward was told that the State Council had recently given the green light to build the nuclear plant somewhere between Ta Ya Wan and Mirs Bay -- a peninsula northeast of Hong Kong.

The news has, however, taken both China Light and Power Co and the Hong Kong Government by surprise.

A spokesman for China Light said it had not received any "information or notification" from China on the proposed joint venture between his company and the Guangdong Power Co.

Joint negotiations between the two companies have been underway for many months.

A senior Hong Kong Government official yesterday said the government had no knowledge that approval for the project had been given by Beijing.

"It's very exciting news. I am trying to check this," he said.

CSO: 5100/2244

BRIEFS

MONGOLIA, INDIA COMMUNIQUE--New Delhi, August 15 (XINHUA)--India and Mongolia in a joint communique today expressed their concern over the deterioration of the international situation and the growing nuclear danger. They also stressed the need to undertake genuine measures of disarmament and intensify the search for lasting peace and stability. The communique was issued at the end of Mongolian Foreign Minister Mangal Dugersuren's 3-day visit to India. The two sides reiterated their commitment to the principles of peaceful coexistence and the norms guiding the relations between states laid down in the UN Charter, as the basis for promoting international peace, cooperation and understanding. During the visit, the two countries signed two protocols for long-term cooperation in the fields of agricultural research and health. The two countries have agreed to form a joint consultative committee of experts to implement the protocols. [Text] [OW150746 Beijing XINHUA in English 0730 GMT 15 Aug 82]

CSO: 5100/2244

URANIUM ENRICHMENT PLANT SITES NEAR CITIES INVESTIGATED

Brisbane-Area Inspection

Brisbane THE COURIER-MAIL in English 29 Jul 82 p 1

[Article by Peter Morley]

[Text]

AN Australian mining group has inspected near-Brisbane areas to assess their suitability as sites for a uranium enrichment plant.

The investigations were carried out earlier this month by the Uranium Enrichment Group which looked at the Caboolture and Ipswich areas as part of a three-state search for a site.

The other states are South Australia and Western Australia where areas close to the respective capitals have been considered.

So far the group has taken no decision on a site or what technology would be employed in the enrichment process. The group is understood to include BHP, CSR, Western Mining and Peko-Wallsend.

But as a result of the current research, the group expects to be able to make a final assessment around the middle of next year.

It is understood that during the Queensland investigations which began on July 5, the group had talks with a large State Government inter-department body set up to consider any move for a uranium enrichment plant here.

The Premier, Mr Bjelke-Petersen, has always maintained that the state would welcome uranium enrichment, a step that would be unacceptable to many, particularly if a plant were built on Brisbane's doorstep.

A spokesman for Mr Bjelke-Petersen yesterday confirmed reports by public servants that uranium enrichment projects were discussed by Cabinet on Tuesday but would not comment further.

It could not be confirmed last night but it is believed that Cabinet, after being told that sites close to Brisbane were under examination, continued to express interest in this type of project.

The reluctance of ministers to comment is in line with the cloak of secrecy that was thrown round the inspections by the group, one of at least three consortiums investigating the potential for enrichment plants.

During the inspections to the north and south of Brisbane, the group considered infrastructure requirements and environmental matters and concluded that the Caboolture and Ipswich areas were the types that would be suitable if the project proceeded.

City Council Resistance

Brisbane THE COURIER-MAIL in English 30 Jul 82 p 2

[Text] The Brisbane City Council would do everything possible to mobilise public opinion against the building of a nuclear power station in or near Brisbane, the Vice Mayor, Alderman Ardill, said yesterday.

And the Ipswich Mayor, Alderman Freeman, accused the Queensland Government of sacrificing public safety for the interests of a uranium mining consortium.

An Australian mining operation, the Uranium Enrichment Group, earlier this month visited areas near Ipswich and Caboolture to assess their suitability as sites for a uranium enrichment plant.

It is believed State Cabinet discussed and expressed interest in such projects on Tuesday.

Alderman Ardill said: "We don't want any Three Mile Island disasters around here."

He said the Brisbane City Council did not have a policy on nuclear power stations.

If the State Government announced plans for such a power station in or near Brisbane the council might move to amend the Town Plan to prohibit nuclear power stations.

But the State Government had overriding control over the Town Plan and could quash such an amendment, he said.

Alderman Ardill said his objection to the nuclear industry was largely based on health and safety factors.

Alderman Freeman said he was "completely and unequivocally"opposedd to an uranium enrichment plant being built near Ipswich and would lead protests against such a development.

He said the Ipswich study had been conducted without his knowledge or approval.

Alderman Freeman said it appeared that the State Cabinet had given tacit approval to the project.

The State Opposition Leader, Mr Casey, said that if the Premier wanted a uranium enrichment plant in Queensland, he should built it near his own home at Kingaroy.

A Campaign Against Nuclear Power group organiser, Ms Jenny Pierson said a uranium processing plant near Brisbane could put the city on a foreign country's nuclear "hit-list" in the event of war.

Search in West

Perth THE WEST AUSTRALIAN in English 30 Jul 82 p 11

[Text]

SEVERAL WA sites are being considered for a uranium enrichment plant.

They have been examined by the Uranium Enrichment Group which is carrying out a feasibility study in cooperation with the Federal Government on the establishment enrichment industry.

The office of the Minister for Fuel and Energy, Mr Jones, confirmed yesterday that talks had been arranged between the group and State Government officials.

There was no information on which locations were being investigated.

The group, comprising CSR, BHP, Western Mining Corporation and Peko Wallsend, began a full study early this year.

Approval

The Federal Government gave approval after studying its prefeasibility report.

A full report should be put before the Government during 1984.

The group's brief is to advise on the most suitable enrichment technology, the supplier of the technology and the best plant site.

A spokesman for the group said from Sydney yesterday that sites in three States—WA, Queensland and South Australia—were being studied.

The decision on a site would depend on the type of technology chosen and the attitudes of the State governments.

Two enrichment methods — centrifuge and chemical exchange —were being considered.

The Federal Minister for National Development and Energy, Senator Carrick, has indicated that the Government would like to be in a position to have an Australian enrichment industry operational late this decade.

Power

This would allow Australia to supply an international market for enriched fuel for nuclear power generation which is expected to expand in the 1990s.

According to the chairman of the Australian Atomic Energy Commission, Professor Don George, Australia could be exporting 9000 tonnes of uranium—worth up to $630 million at today's values—by 1990.

If all the ore were enriched in Australia, the added value would be $888 million in a year.

CSO: 5100/7551

LABOR PARTY ISSUES PLAN FOR NUCLEAR-FREE HEMISPHERE

Bowen Statement

Canberra THE AUSTRALIAN in English 27 Jul 82 p 3

[Article by Ted Knez]

[Text]

THE federal ALP yesterday proposed a radical plan in which a Labor government would try to negotiate an international treaty banning all nuclear weapons from the southern hemisphere.

The plan, outlined by the Opposition spokesman on Foreign Affairs, Mr Bowen, would be implemented within four months of the election of a federal Labor government.

Mr Bowen, who was addressing the Australian Institute of International Affairs in Canberra, said the entire Southern Hemisphere should be declared a nuclear-weapons-free zone.

Under a Labor government the treaty would be negotiated by convening a conference of all nations in the southern hemisphere, he said.

"Large areas of the southern hemisphere are already nuclear-weapons-free by treaty and there are therefore powerful precedents and a substantial base on which to expand," Mr Bowen said.

"The continents of Antarctica and South America are already covered by bans on nuclear weapons.

"The United Nations and the Organisation of African Unity have called for a nuclear-free African continent and well over 100 nations support the Nuclear Non-Proliferation Treaty aimed at preventing the spread of nuclear weapons.

"These existing agreements and aspirations could be built on and brought together into an international treaty formally establishing the whole of the southern hemisphere as a region permanently free of any nuclear weapons."

Mr Bowen said such a zone would apply to States in this hemisphere and States functioning as metropolitan powers.

They would be required to agree not to develop, manufacture, test, acquire or possess nuclear weapons nor to permit any other States to do so in or over territory under their control.

It would also require the agreement of states not to install, store, test or launch nuclear weapons into or from the southern hemisphere.

Such a zone would not preclude transit through the southern hemisphere of nuclear-powered or nuclear-armed vessels, Mr Bowen said.

"This is an ideal to aim for — but is by no means impractical or utopian since the basis for it already exists," he said.

The Labor Party's commitment to effective measures for arms control included support for arms limitation arrangements in the Indian Ocean, such as the Zone of Peace proposal, and support for a nuclear free zone in the Southern Pacific area.

Committed

"These policies are even more significant in view of the failure of the recent UN Special Session on Disarmament," Mr Bowen said.

He said Australia was already "unequivocally committed" to the preservation of the entire Antarctic continent and surrounding oceans as a demilitarised and nuclear-free zone.

This commitment was formally respected by several other southern hemisphere states (including Argentina and South Africa), and by both superpowers in the Antarctic Treaty.

Australia's adherence to and support for the Nuclear Non-Proliferation Treaty had always had bi-partisan political support, he said.

Mr Bowen said there was also bi-partisan opposition in Australia to French nuclear testing in the Pacific.

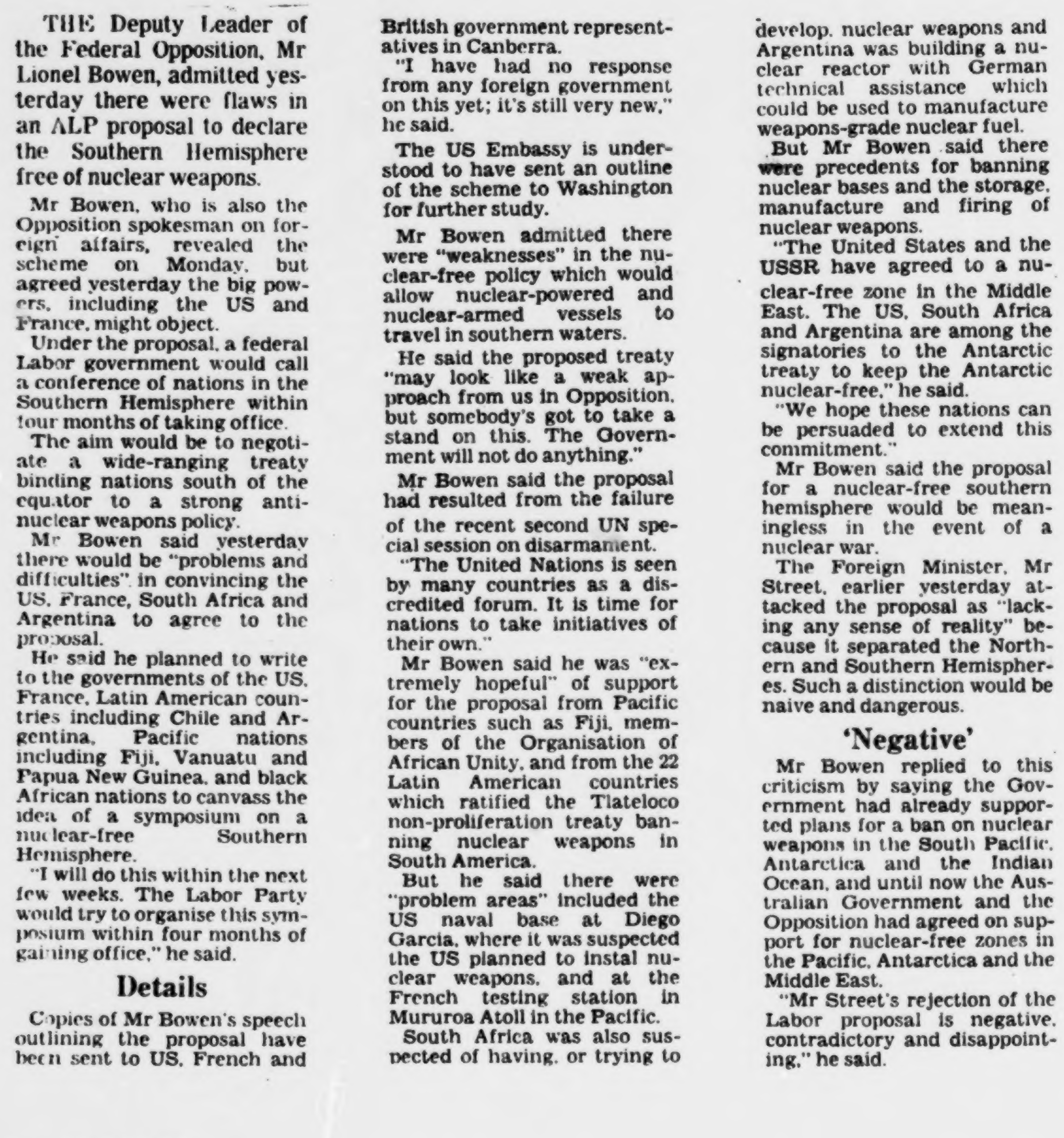
"I am sure all southern hemisphere states want an end to nuclear tests in this hemisphere and, ultimately, the conclusion of a comperehensive test-ban treaty," he said.

Problem Issues

Canberra THE AUSTRALIAN in English 28 Jul 82 p 26

[Article by Marsali MacKinnon]

[Text]



THE Deputy Leader of the Federal Opposition, Mr Lionel Bowen, admitted yesterday there were flaws in an ALP proposal to declare the Southern Hemisphere free of nuclear weapons.

Mr Bowen, who is also the Opposition spokesman on foreign affairs, revealed the scheme on Monday, but agreed yesterday the big powers, including the US and France, might object.

Under the proposal, a federal Labor government would call a conference of nations in the Southern Hemisphere within four months of taking office.

The aim would be to negotiate a wide-ranging treaty binding nations south of the equator to a strong anti-nuclear weapons policy.

Mr Bowen said yesterday there would be "problems and difficulties" in convincing the US, France, South Africa and Argentina to agree to the proposal.

He said he planned to write to the governments of the US, France, Latin American countries including Chile and Argentina, Pacific nations including Fiji, Vanuatu and Papua New Guinea, and black African nations to canvass the idea of a symposium on a nuclear-free Southern Hemisphere.

"I will do this within the next few weeks. The Labor Party would try to organise this symposium within four months of gaining office," he said.

Details

Copies of Mr Bowen's speech outlining the proposal have been sent to US, French and British government representatives in Canberra.

"I have had no response from any foreign government on this yet; it's still very new," he said.

The US Embassy is understood to have sent an outline of the scheme to Washington for further study.

Mr Bowen admitted there were "weaknesses" in the nuclear-free policy which would allow nuclear-powered and nuclear-armed vessels to travel in southern waters.

He said the proposed treaty "may look like a weak approach from us in Opposition, but somebody's got to take a stand on this. The Government will not do anything."

Mr Bowen said the proposal had resulted from the failure of the recent second UN special session on disarmament.

"The United Nations is seen by many countries as a discredited forum. It is time for nations to take initiatives of their own."

Mr Bowen said he was "extremely hopeful" of support for the proposal from Pacific countries such as Fiji, members of the Organisation of African Unity, and from the 22 Latin American countries which ratified the Tlateloco non-proliferation treaty banning nuclear weapons in South America.

But he said there were "problem areas" included the US naval base at Diego Garcia, where it was suspected the US planned to instal nuclear weapons, and at the French testing station in Mururoa Atoll in the Pacific.

South Africa was also suspected of having, or trying to develop, nuclear weapons and Argentina was building a nuclear reactor with German technical assistance which could be used to manufacture weapons-grade nuclear fuel.

But Mr Bowen said there were precedents for banning nuclear bases and the storage, manufacture and firing of nuclear weapons.

"The United States and the USSR have agreed to a nuclear-free zone in the Middle East. The US, South Africa and Argentina are among the signatories to the Antarctic treaty to keep the Antarctic nuclear-free," he said.

"We hope these nations can be persuaded to extend this commitment."

Mr Bowen said the proposal for a nuclear-free southern hemisphere would be meaningless in the event of a nuclear war.

The Foreign Minister, Mr Street, earlier yesterday attacked the proposal as "lacking any sense of reality" because it separated the Northern and Southern Hemispheres. Such a distinction would be naive and dangerous.

'Negative'

Mr Bowen replied to this criticism by saying the Government had already supported plans for a ban on nuclear weapons in the South Pacific, Antarctica and the Indian Ocean, and until now the Australian Government and the Opposition had agreed on support for nuclear-free zones in the Pacific, Antarctica and the Middle East.

"Mr Street's rejection of the Labor proposal is negative, contradictory and disappointing," he said.

CSO: 5100/7550

JABILUKA URANIUM MINE GETS FEDERAL OK; FUTURE UNCLEAR

Anthony Remarks

Melbourne THE AGE in English 27 Jul 82 p 3

[Article by David Uren and Stephen Mills]

[Text]

Pancontinental Mining has no plans for starting construction of the big Jabiluka uranium mine in the Northern Territory, despite receiving overnment approval for the project yesterday.

A company spokesman said the project could not go ahead until enough export contracts had been secured.

Pancontinental officials have been talking to possible users for 10 years and have been actively seeking contracts since conditional approval was given by the Government on 17 March this year.

The Government's approval signified that the project had overcome all environmental and social objections to its development but it still needed the sales, one spokesman said.

The Trade and Resources Minister, Mr Anthony, said yesterday the Jabiluka joint venturers planned to begin construction during the dry season next year, depending on market and financing arrangements. On that basis production could be expected to start at Jabiluka towards the end of 1986, he said, in announcing that the Northern Territory Government could award mining leases for the project.

Mr Anthony's confidence about the uranium industry's prospects extended to the nearby deposit at Koongarra. Development spending of "hundreds of millions of dollars" could be expected on Koongarra and Jabiluka by 1988, he said. Mr Anthony said he was certain the long-term future of the industry was assured, but he admitted that it was "going through a slack period" at present.

Pancontinental will not reveal what it would regard as a minimum tonnage for the project to go ahead, but industry sources say contracts covering at least 3000 tonnes a year for 10 years would be required. This is about 7 per cent of the world's total uranium consumption and with the market now heavily oversupplied, such contracts will be difficult to find.

Stockpiles

Mines around the world are turning out about 50,000 tonnes of uranium a year, while consumption by nuclear power stations is only about 25,000 tonnes a year. The rest is adding to the already burgeoning stockpiles maintained by the power utilities.

The other problem which Pancontinental has yet to resolve is the level of foreign ownership. At present, Getty Oil of America holds a 35 per cent interest in the Jabiluka project.

The Foreign Investment Review Board guidelines say that foreigners can own no more than 25 per cent of a uranium mine. The Pancontinental spokesman said this was a matter for Getty Oil to resolve with the FIRB. It did not have to be settled until the mine had been built and exports were ready to begin, he said.

Mr Anthony attacked the Labor Party for "ignoring the reality" of the uranium industry. Its new policy committed it to destroying the industry slowly, with the maximum confusion, he said.

"It is clear now, after the smoke has cleared that it was uranium which tripped off the explosion on the leadership that has shattered the Labor Party.

"Those who wanted to punish Mr Hayden for his stand on uranium first promised support to Mr Hawke, then swung back to Mr Hayden.

"Without their support, Mr Hayden would not be Labor leader now. No one could seriously believe he will not repay that debt if Labor ever comes to power," Mr Anthony said.

French Overtures

Canberra THE AUSTRALIAN in English 23 Jul 82 p 13

[Article by Anton Whitehead]

[Text]

THE French nuclear industry is interested in taking equity in the rich Jabiluka uranium project, representatives of the Northern Territory Mines and Energy Department said yesterday.

Chief Minister, Mr Everingham, the Minister for Mines and Energy, Mr Tuxworth, and secretary of the Department of Mines and Energy, Mr Purcell said the French wanted a stake in the project.

"The French have told us they want a piece of Jabiluka because of the nature of the ore body, its size and location in Australia," Mr Purcell said.

He said the French wanted a 100 per cent nuclear base load — electric power — within a decade and Jabiluka was a part of their long-term plans.

But any attempt by the French to buy into Jabiluka would run into Foreign Investment Review Board problems.

The FIRB requires uranium projects to be 75 per cent Australian owned and the foreign-owned Getty Oil Development Co Ltd already has a 35 per cent interest and is required to cut its stake.

Mr Everingham and Mr Tuxworth are hopeful construction at Jabiluka will begin by the next dry season, but contracts have not yet been signed and buyers are sitting on the sidelines waiting for an economic recovery and for uranium prices to bottom.

The spot price for uranium is $19 a lb, compared with the floor price set by the Federal Government of more than $30.

Mr Tuxworth said the government floor price should not be a worry as uranium was "worth only what you can get for it and not what the Government decides it is worth."

Territorial Government Plans

Melbourne THE AGE in English 26 Jul 82 p 3

[Article by Stephen Mills]

[Text]

CANBERRA. — The Northern Territoy Government is set to give the go-ahead for the huge Jabiluka uranium mine, on the edge of the Kakadu National Park.

The NT Minister for Mines and Energy, Mr Tuxworth, will announce tomorrow that Pancontinental Mining Ltd will be granted mining leases for Jabiluka, the richest uranium mine in Australia.

The announcement coincides with a new round of exploration in the uranium-rich Kakadu region, east of Darwin. A consortium of companies is believed to be preparing for an aerial survey of potential deposits in land where Aboriginal ownership is still disputed, while Queensland Mines is about to renew exploration on its mined-out Nabarlek lease.

Despite the activity, however, the future of all new uranium projects remains clouded because of an oversupply of yellow-cake and a three-year slide in its price on world markets.

The downturn has prevented Pancontinental from signing contracts for Jabiluka ore, and despite winning mining approval it may not go ahead immediately with construction of the $400 million mine.

NT Government Ministers are confident that contracts can be signed, and that work will start this year. They are optimistic that French nuclear energy users will buy Jabiluka ore on long-term contracts, possibly in exchange for an equity interest in the project.

However industry sources are less confident about Jabiluka's future. They point to the existence of the nearby Ranger mine, which is already in full production and has vast reserves available to be mined.

If Pancontinental does proceed with the mine, it will come under the ALP's new, softened, uranium policy. Like Ranger it would be liable to be "phased out" in the event of the election of a Labor Government, but its contracts would not be repudiated.

Mining approval for the Jabiluka project follows lengthy consultation with Aboriginal communities

The Northern Land Council and traditional owners have agreed to a deal which will give them royalties of about $11 million.

The Jabiluka mine has estimated reserves of more than 200,000 tonnes. The Ranger Mine, operated by Energy Resources of Australia ,has reserves of 125,000 tonnes. A third mine in the region, Nabarlek, has already been mined out and 12,000 tonnes of ore are stockpiled awaiting sale.

Unlike Ranger, Jabiluka will be an underground mine — entailing greater cost but less damaging to the sensitive environment.

Labor Party Warning

Canberra THE AUSTRALIAN in English 28 Jul 82 p 1

[Article by Russell Schneider]

[Text]

THE Labor Party yesterday warned miners, investors and buyers that they faced an "extremely risky" decision in opening up new uranium mines in Australia.

The Labor spokesman on the environment, Mr Stewart West, said that the proposed Jabiluka mine would not be approved under present ALP policy.

The Federal Government on Monday announced it was prepared to grant a 42-year mineral lease to Pancontinental Mining and Getty Oil on the Jabiluka project.

But Mr West warned that a Labor government would almost certainly veto the project.

He said the ALP's recent national conference decisions meant that the only uranium mines able to continue operating under a Labor government policy would be Ranger and Nabarlek.

"I think it is unwise for Pancontinental to go touting overseas for contracts in this situation," he said.

"I think Pancontinental is acting in an irresponsible manner.

"If Labor wins the next election, under the current policy, there will not even be a question of compensating the workforce.

"To continue this project must be putting shareholders' money at risk.

"The ALP policy seems to rule out all mines with the exception of Ranger and Nabarlek if Labor comes to power.

"It would certainly rule out Jabiluka.

"If they are not on stream by June 1982 we are certainly not committed to allow them to continue.

"This particular mine cannot be on stream before 1983.

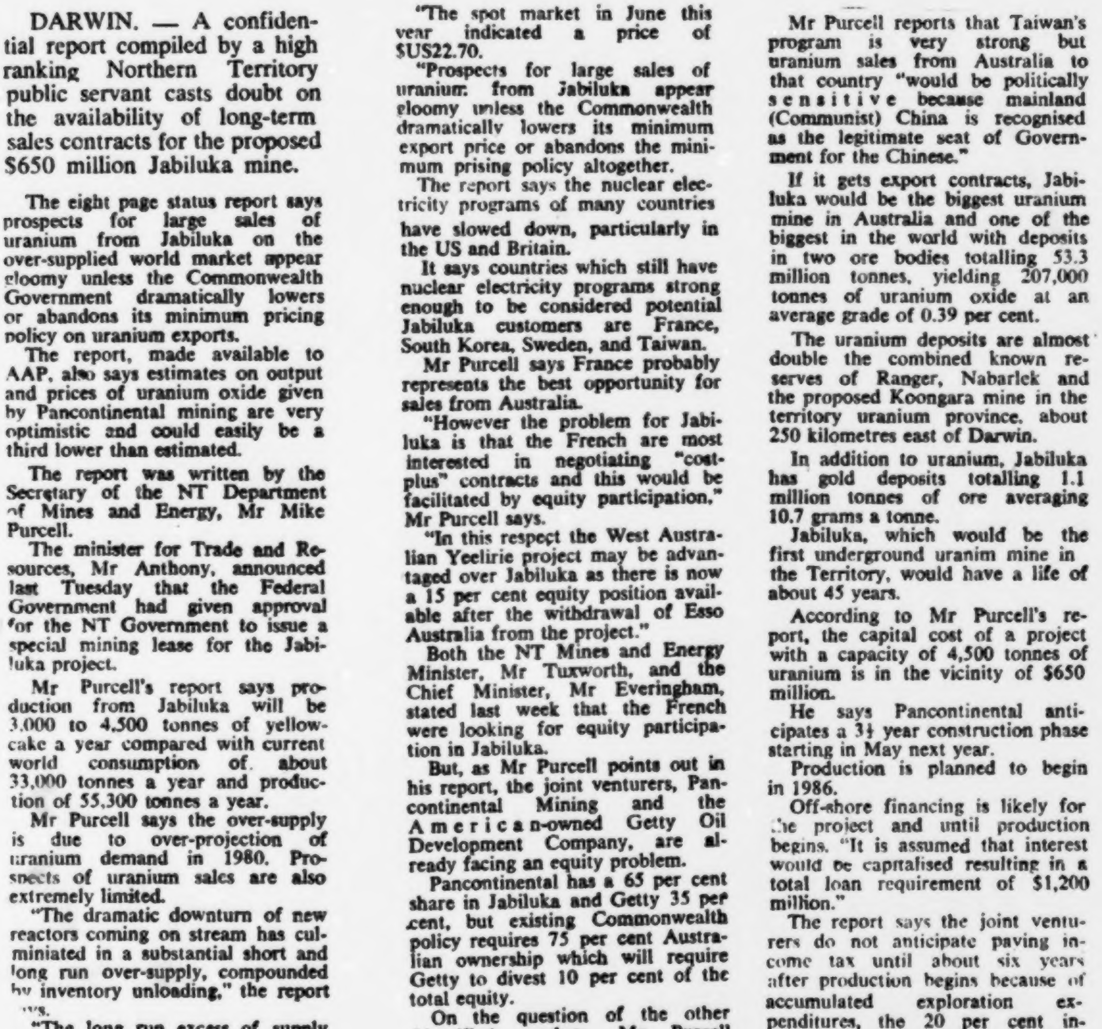
"Therefore it is an extremely risky enterprise to say the least."

NT Report on Prospects

Sydney THE SYDNEY MORNING HERALD in English 2 Aug 82 p 15

[Article by Brian Johnstone]

[Text]



DARWIN. — A confidential report compiled by a high ranking Northern Territory public servant casts doubt on the availability of long-term sales contracts for the proposed $650 million Jabiluka mine.

The eight page status report says prospects for large sales of uranium from Jabiluka on the over-supplied world market appear gloomy unless the Commonwealth Government dramatically lowers or abandons its minimum pricing policy on uranium exports.

The report, made available to AAP, also says estimates on output and prices of uranium oxide given by Pancontinental mining are very optimistic and could easily be a third lower than estimated.

The report was written by the Secretary of the NT Department of Mines and Energy, Mr Mike Purcell.

The minister for Trade and Resources, Mr Anthony, announced last Tuesday that the Federal Government had given approval for the NT Government to issue a special mining lease for the Jabiluka project.

Mr Purcell's report says production from Jabiluka will be 3,000 to 4,500 tonnes of yellowcake a year compared with current world consumption of about 33,000 tonnes a year and production of 55,300 tonnes a year.

Mr Purcell says the over-supply is due to over-projection of uranium demand in 1980. Prospects of uranium sales are also extremely limited.

"The dramatic downturn of new reactors coming on stream has culminiated in a substantial short and long run over-supply, compounded by inventory unloading," the report says.

"The long run excess of supply has been accumulating for a decade and has been disguised by the growth of uranium stockpiles.

"The Commonwealth is still maintaining its present pricing policy — a minimum export price of $30 dollars per lb of uranium oxide plus a formula cognisant of escalatng production costs.

"The spot market in June this year indicated a price of $US22.70.

"Prospects for large sales of uranium from Jabiluka appear gloomy unless the Commonwealth dramatically lowers its minimum export price or abandons the minimum prising policy altogether.

The report says the nuclear electricity programs of many countries have slowed down, particularly in the US and Britain.

It says countries which still have nuclear electricity programs strong enough to be considered potential Jabiluka customers are France, South Korea, Sweden, and Taiwan.

Mr Purcell says France probably represents the best opportunity for sales from Australia.

"However the problem for Jabiluka is that the French are most interested in negotiating "cost-plus" contracts and this would be facilitated by equity participation," Mr Purcell says.

"In this respect the West Australian Yeelirie project may be advantaged over Jabiluka as there is now a 15 per cent equity position available after the withdrawal of Esso Australia from the project."

Both the NT Mines and Energy Minister, Mr Tuxworth, and the Chief Minister, Mr Everingham, stated last week that the French were looking for equity participation in Jabiluka.

But, as Mr Purcell points out in his report, the joint venturers, Pancontinental Mining and the American-owned Getty Oil Development Company, are already facing an equity problem.

Pancontinental has a 65 per cent share in Jabiluka and Getty 35 per cent, but existing Commonwealth policy requires 75 per cent Australian ownership which will require Getty to divest 10 per cent of the total equity.

On the question of the other identified markets, Mr Purcell says South Korea's nuclear program is strong but they are unhappy with the Australian pricing policy and recently rejected a contract with Queensland Mines Ltd, which operates the Nabarlek mine, about 50 kilometres north-east of the Jabiluka project area.

Mr Purcell reports that Taiwan's program is very strong but uranium sales from Australia to that country "would be politically sensitive because mainland (Communist) China is recognised as the legitimate seat of Government for the Chinese."

If it gets export contracts, Jabiluka would be the biggest uranium mine in Australia and one of the biggest in the world with deposits in two ore bodies totalling 53.3 million tonnes, yielding 207,000 tonnes of uranium oxide at an average grade of 0.39 per cent.

The uranium deposits are almost double the combined known reserves of Ranger, Nabarlek and the proposed Koongara mine in the territory uranium province, about 250 kilometres east of Darwin.

In addition to uranium, Jabiluka has gold deposits totalling 1.1 million tonnes of ore averaging 10.7 grams a tonne.

Jabiluka, which would be the first underground uranim mine in the Territory, would have a life of about 45 years.

According to Mr Purcell's report, the capital cost of a project with a capacity of 4,500 tonnes of uranium is in the vicinity of $650 million.

He says Pancontinental anticipates a 3½ year construction phase starting in May next year.

Production is planned to begin in 1986.

Off-shore financing is likely for the project and until production begins. "It is assumed that interest would be capitalised resulting in a total loan requirement of $1,200 million."

The report says the joint venturers do not anticipate paying income tax until about six years after production begins because of accumulated exploration expenditures, the 20 per cent investment allowance and rapid write-offs available for capital investment in mining.

On the question of royalties, Mr Purcell points out that uranium is owned by the Commonwealth and uranium royalties will accrue to the Commonwealth Government at a rate of 5.5 per cent until 1990.

Under the financial memorandum of understanding between the Commonwealth and the NT GOVERNMENTS, THE Commonwealth is to pay to the NT an amount in lieu of royalty of 1.25 per cent of the value of yellowcake at the mine.

When ownership of uranium is transferred to the Territory — a question yet to be decided between the two governments — the royalty rate of 5½ per cent will be maintained until 1990 but the territory's new Mineral Royalty Bill, which sets a royalty rate of 18 per cent on pre-tax profits, will come into force.

Gold is owned by the Territory and the provisions of its new Royalty bill will apply immediately on gold production.

The report sets out estimates of royalty revenue to the Territory between 1986 and 2010 under Commonwealth and Territory ownership.

It estimates that during that period, total undiscounted payments to the Territory under Commonwealth ownership would be $175 million, with total discounted payments estimated at $50 million.

Under Territory ownership, total undiscounted payments are estimated at $950 million with a discounted figure of $155 million.

It is estimated that total undiscounted payments to Aborigines by the company and the Commonwealth in that period would be $640 million, with total discounted payments of $125 million.

The report reveals the pre-production payments to Aborigines in the final agreement between the Northern Land Council and companies amount to $8.8 million.

No details of that agreement, which was signed just under a fortnight ago, have yet been released publicly but recent reports have put the figure at between $10 and $14 million.

The Aborigines will also receive an annual payment of 2 per cent of the value of the yellowcake at the mine.

Thereafter, the annual payments are to be at a rate of 2½ per cent with payments from the Commonwealth of an additional 2½ per cent.

Company Response

Perth THE WEST AUSTRALIAN in English 2 Aug 82 p 18

[Text]

SYDNEY: Pancontinental Mining had its own long-term arrangements in the uranium market-place that were not dependent on government reports or general documents, the company's chairman, Mr Anthony Grey, said last night.

He said: "We haven't signed any contracts but we're confident that we'll meet our expectations of 3000 tonnes, building to 4500 tonnes over two years.

"I can't be more specific than that. We know our business. We've been in it for some time."

Pancontinental and Getty Oil Development Company are joint venturers in the proposed $650 million Jabiluka uranium mine in the Northern Territory.

A confidential report compiled by a high-ranking NT public servant, Mr Mike Purcell, said that prospects for large uranium sale from Jabiluka on the oversupplied world market appeared gloomy unless the Federal Government lowered or abandoned its minimum-pricing policy on uranium.

The report said that estimates of uranium oxide output and prices given by Pancontinental were very optimistic and could easily be a third lower than estimated.

Mr Grey said: "What we're offering in the market-places of Japan, Korea, Germany, France, Sweden andthe United States is long-term strategic access to security of supply.

"When sources are short our customers will know they can still be confident of supply for their utilities.

'Nothing new'

"There's nothing new about current estimates of over supply —but what we're saying is 'Give us your orders now and we'll still be able to fulfil them when supplies are short'."

Mr Purcell's report said that Jabiluka would produce 3000 to 4500 tonnes of yellowcake a year compared with current world consumption of about 33,000 tonnes and production of 55,300 tonnes per year.

In CANBERRA, a spokesman for the Trade and Resources Minister, Mr Anthony, said that the Government was committed to the full development of a uranium industry.

The Government was actively working to ensure that.

The floor price policy was to a large degree supported by the industry and change in that policy was not being considered.

CSO: 5100/7549

AUSTRALIA

ROXBY DOWNS ORE DEPOSIT DESCRIBED; IMPACT REPORT DUE

Uranium Statistics

Melbourne THE AGE in English 27 Jul 82 p 33

[Article by David Uren]

[Excerpts]

Roxby Downs is one of the biggest mineral deposits in the world, according to preliminary data from Western Mining Corporation.

Analysis of just part of the deposit has shown about 2000 million tonnes of ore containing 32 million tonnes of copper, 1.2 milliontonnes of uranium and 1200 tonnes of gold.

WMC's executive director, Mr Hugh Morgan, said last night: "Its richness lies not so much in its grades, as in its extraordinary size which will require large scale operations."

Part of the high grade ore reserve is near the Whenan exploration, shaft which is being sunk into the orebody. Detailed drilling is in progress in this area in an effort to establish a proven ore reserve.

The uranium content of 0.6 kilogrammes a tonne is only about a fifth of that at Ranger uranium mine, but is a significant component in the value of the ore.

At current prices, one tonne of the ore would contain copper worth $24, uranium worth $26 and gold worth $7.50. This suggests a value of ore of $US57.50 for a tonne of ore.

The Roxby indenture agreement with the South Australian Government calls for the feasibility study to be completed by the end of 1984. Company officials suggest the study could be completed sooner.

Environmental Report

Canberra THE AUSTRALIAN in English 28 Jul 82 p 11

[Article by Bruce Jacques]

[Text]

NOW that Western Mining Corp has got the Roxby Downs indenture bill through the South Australian Parliament and confirmed the deposit as one of the world's largest copper orebodies, the next battleground on the way to development is likely to be environmental.

The environmental impact statement (EIS), part of the $100 million feasibility study being undertaken by WMC and its joint venture partner at Roxby, the BP group – is expected next month.

The EIS should make development intentions for the huge resource project much clearer, although it will also give opponents of the project another chance to try to impede its progress.

Environmental opposition is likely to centre around the uranium issue.

At the moment, only the basic outline of how the deposit will be developed is available and most of that relates to the companies' agreement with the South Australian Government.

Subject to the outcome of the feasibility study, this commits the companies to spend about $1000 million to develop a mine ultimately to produce about 150,000 tonnes of contained copper with mine start-up in 1987.

That has now probably been pushed back to 1989 by the sheer scale of the operation, but the EIS may well fill in a lot of other gaps.

WMC and BP, for instance, are still working on their optimum production mix from Roxby which is also rich in gold and uranium.

This will not only depend on the cheapest and best mining methods but also on markets.

To an extent, the companies have already narrowed their development options by sinking a $50 million 480m exploration-cum-development shaft (known as the Whenan shaft) in the central high grade area of the orebody.

Nucleus

Western Mining indicated on Monday that the 28 sq km orebody outlined so far at Roxby contains an estimated 2000 tonnes of ore averaging 1.6 per cent copper, 0.64 kg a tonne of uranium oxide and 38.5 million oz of gold at extremely variable grades.

The Whenan shaft is being sunk in an area where the copper grades average a much higher 2.45 per cent copper and 0.93 per cent uranium but gold grades are again variable.

The shaft will take about two years to sink and one year's work has already been done.

There is little doubt that this shaft will form the nucleus of any mine development and while it is still being officially referred to as an exploration shaft, the partners make no secret of the fact that it will be big enough for production.

Having started development in this high grade area, the partners would then have a number of options, all of which would depend on comparative costs.

For instance, it could be cheaper to develop one or more other high grade areas simultaneously with the Whenan shaft, effectively making Roxby a dual or triple mine.

But at this stage it is most likely the partners will sink a number of shafts in the Whenan area to reach full production targets.

The partners are also working on how they should process the ore once it is won.

A lot of time is being spent deciding exactly which technology should be used for the processing, an area in which WMC's experience in nickel – it runs a smelter at Kalgoorlie and a refinery at Kwinana – will prove valuable.

CSO: 5100/7550

EDITORIAL RAPS VICTORIA'S CAIN FOR NUCLEAR-SHIP BAN STAND

Melbourne THE AGE in English 29 Jul 82 p 13

[Text]

WHEN the Cain Government's attempt to ban nuclear-powered and nuclear-armed ships from Victorian ports became known last month, we described it as the new Labor administration's first major folly. As the Premier should have known, the State has no constitutional authority to enforce this aspect of Labor's idealistic urge to declare Victoria a nuclear-free zone. All that the quixotic gesture achieved was to enable the Prime Minister, Mr Fraser, to exploit to his political advantage the Labor Party's divisions over nuclear energy and ambivalence towards the American alliance.

Now Mr Cain has compounded his foolishness by summoning the American Consul-General, Mr Donald Cleveland, to protest against the visit to Melbourne next week of the USS Goldsborough, which may or may not be nuclear-armed. The Premier is entitled to his well-founded opinion that Mr Fraser's eagerness to invite the US Navy to accept the hospitality of Australian ports is not innocent of political motivation. But Mr Cain cannot convincingly complain about political provocation and foreign interference in domestic affairs when his own Government started it all by trespassing on Commonwealth responsibility for foreign affairs and defence and by exposing the Labor Party to charges that its anti-nuclear feelings are contrary to Australia's strategic interests.

Still less has the Premier any business to be warning the US Consul-General that the Prime Minister was trying to "strain relationships between this Government and the United States". There is no diplomatic relationship between the State of Victoria and the United States. The relationship — and friendly alliance — is between the United States and the Commonwealth of Australia. American diplomats in Australia are well aware of the Federal and party conflicts within this country without being lectured by a State Premier, but they cannot be expected to defer to a provincial Government acting beyond its authority. Mr Cain should accept once and for all that the question of visits of American warships is outside his jurisdiction, and recognise that his quarrel is with Canberra and not with Washington.

CSO: 5100/7550

BRIEFS

NUCLEAR SHIP PROTEST--Brisbane's waterfront was idle yesterday when waterside workers went on strike in protest at the visit of the American nuclear vessel USS Goldsborough. The 24-hour stike by 600 wharfies left nine ships stranded in the port and cost about $1 million in lost production. The secretary of the Queensland Trades and Labor Council, Mr Fred Whitby, said the strike had been called because of the council's policy of opposition to nuclear vessels. He said the USS Goldsborough was not nuclear powered, but had the capacity to carry nuclear missiles. Mr Whitby said only unions which would be in direct contact with the ship had been asked to strike. Other unionists had been urged to take part in a picket against nuclear war outside the PanAm offices in Brisbane yesterday. The USS Goldsborough will leave Brisbane on Monday for Hobart. It will visit Melbourne, Hobart and Sydney during the next two weeks. [Text] [Canberra THE AUSTRALIAN in English 23 Jul 82 p 2]

CSO: 5100/7551

BENEFITS OF INDO-FRENCH PACT ON NUCLEAR FUEL TOLD

Madras THE HINDU in English 9 Aug 82 p 1

[Article by G.K. Reddy]

[Text] New Delhi, Aug 8--An understanding has been reached between India and France that the safeguards to be applied to the French-supplied enriched uranium and its by-products would be the same as those provided for in the 1963 Indo-U.S. agreement.

The understanding reaffirms that the plutonium derived from the reprocessing of the spent fuel at Tarapur would not be used for any explosive purposes in the light of the letters exchanged in 1974 after the Pokhran test.

It was officially confirmed by the visiting French Foreign Minister, Mr Claude Cheysson during his two-hour talk today with the External Affairs Minister, Mr P.V. Narasimha Rao, that France would not insist on any additional safeguards other than what were already being applied to the U.S.-supplied materials under existing agreements.

Cheysson Meets P.M.

This was restated quite explicitly when Mr Cheysson called on the Prime Minister later this evening after her return from Bombay. His one-day visit to Delhi concluded on the reassuring note that the new nuclear fuel supply agreement would be treated as a bilateral agreement between India and France with the concurrence of the United States, thereby implying that the supply would not be interrupted in the event of a new controversy with the U.S. over India's reprocessing rights.

The Indian side was satisfied that the two issues would be effectively delinked under the new arrangement. It was for this reason that India suggested and France readily agreed, that the new fuel supply arrangement should be made through an exchange of bilateral documents between the two countries instead of complicating the matter through a quadrilateral accord between India, United States, France and the International Atomic Energy Agency (IAEA) which could lead to some difficulties in future over the reprocessing question.

The documents to be exchanged between India and France would include as annexures the texts of the 1963 Indo-U.S. agreement, the trilateral understanding reached in 1971 for transferring the inspection responsibilities for the enforcement of the safeguards to the IAEA and the letters exchanged after the 1974 Pokhran test reaffirming that the fissile materials derived from the U.S. supplied fuel for Tarapur would not be used for any explosive purposes.

Addressing a press conference this afternoon, Mr Cheysson indicated the broad features of this understanding saying that India and France had already an agreement on nuclear cooperation. A joint request by India and the U.S. was made towards the end of July through separate but more or less identical communications for the supply of uranium fuel enriched to 2.7 percent to help run the Tarapur plant during the remainder of the 1963 agreement under which the U.S. had assumed the exclusive responsibility to provide fuel for 30 years till 1993.

The French Foreign Minister said his Government had readily agreed to the request in principle. As one of the pioneers in what he called electro-nuclear development, France had the surplus capacity to meet India's requirements. It agreed to supply the fuel within the framework of the existing safeguards at Tarapur which were being enforced through IAEA without insisting on any additional conditions.

Mr Cheysson pointed out that the French readiness to assume this responsibility within the limits of the pre-nuclear non-proliferation treaty (NPT) safeguards already accepted by India had to be viewed in the wider context of the growing political and economic relations between India and France.

He implied that if France had made this departure from its policy of insisting on the stricter safeguards evolved by IAEA after the nuclear non-proliferation treaty came into force, it had been done as a very special case to promote a wide-ranging friendship and cooperation.

Another important feature of the understanding with France is that there would be no obligation on India's part to continue to obtain enriched uranium only from France after the transfer of the fuel supply responsibility by the U.S. to it.

Mr Cheysson, at his press conference, spoke eloquently on the growing Indo-French relations which extended now to various spheres including supply of defence equipment and now even nuclear cooperation and he told him that everything was all right now.

CSO: 5100/7142

CHANGE IN FRENCH STAND ON NUCLEAR FUEL SCORED

BK311428 Bombay THE TIMES OF INDIA in English 25 Aug 82 p 8

[Editorial: "French Volte Face"]

[Text] Regrettably, the amicable settlement of the vexed issues of fuel for the Tarapur plant with the Reagan administration is in danger of coming unstuck. The main responsibility for this unfortunate development lies on France, which had agreed to take over from the U.S. the obligation to supply enriched uranium until 1993 when the Indo-U.S. agreement on Tarapur expires. While doing so, France had clearly stated that it would accept the responsibility on the basis of the existing safeguards agreed upon by India, the U.S. and the International Atomic Energy Agency (IAEA) trilaterally. This assurance was reaffirmed most unambiguously by the French foreign minister, Mr Claude Cheysson, on a visit to New Delhi only the other day. And yet France has suddenly and sharply changed its position.

In a note to the External Affairs Ministry, it has demanded that India should negotiate a fresh agreement with IAEA. Since the IAEA, in cooperation with the London club of nuclear suppliers, has worked out a standard safeguards system to cover all transactions in nuclear equipment and materials, the implication clearly is that the supply of French fuel can begin only if this country accepts safeguards which are far more restrictive and stringent than those applying to Tarapur at present. For one thing, there will be a pursuit clause which means that any nuclear facility where any by-product of Tarapur is used, however remotely, will automatically come under the IAEA safeguards. For another, the new safeguards will remain in force in perpetuity while the existing ones are due to lapse with the expiry of the Indo-U.S. agreement in 1993.

For well over four years, India has resisted U.S. pressure to accept the so-called full-scope safeguards as the price for continued supplies of enriched uranium. The main merit of the Indo-U.S.-French deal was that it offered a way out of the impasse without forcing either this country or the United States to abandon its basic position on safeguards. All this has now been endangered by the French volte face. The reasons for it remain obscure. But it seems a safe bet that the French have acted under pressure from the IAEA or the London club or the United States or all the three.

In any case, whatever the French motivation, Paris must know that New Delhi will not accept from it the kind of demands that successive Indian governments have rejected from the U.S. Appropriately New Delhi has put Washington on notice that the primary responsibility for implementing the understanding on Tarapur rests with the latter.

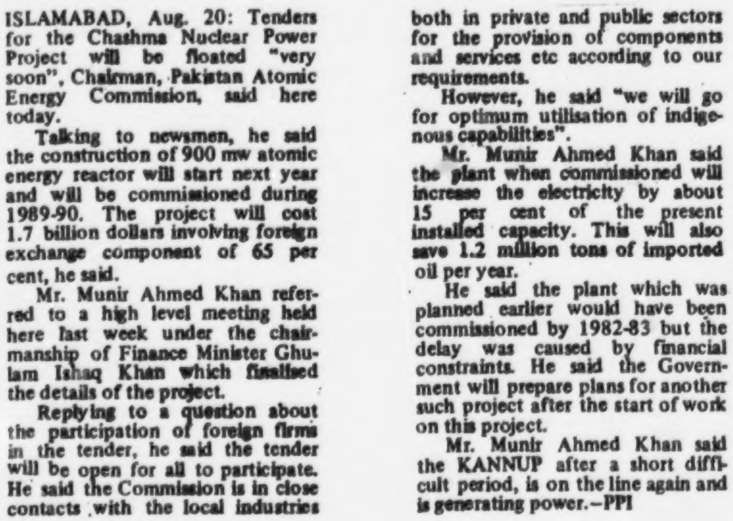
If this approach proves ineffective, this country will have every right to terminate the Indo-U.S. agreement and run Tarapur on the basis of the indigenously developed mox fuel cycle.

CSO: 5100/2246

TENDERS FOR CHASHMA NUCLEAR PROJECT SOON

Islamabad THE MUSLIM in English 21 Aug 82 p 8

[Text]



ISLAMABAD, Aug. 20: Tenders for the Chashma Nuclear Power Project will be floated "very soon", Chairman, Pakistan Atomic Energy Commission, said here today.

Talking to newsmen, he said the construction of 900 mw atomic energy reactor will start next year and will be commissioned during 1989-90. The project will cost 1.7 billion dollars involving foreign exchange component of 65 per cent, he said.

Mr. Munir Ahmed Khan referred to a high level meeting held here last week under the chairmanship of Finance Minister Ghulam Ishaq Khan which finalised the details of the project.

Replying to a question about the participation of foreign firms in the tender, he said the tender will be open for all to participate. He said the Commission is in close contacts with the local industries both in private and public sectors for the provision of components and services etc according to our requirements.

However, he said "we will go for optimum utilisation of indigenous capabilities".

Mr. Munir Ahmed Khan said the plant when commissioned will increase the electricity by about 15 per cent of the present installed capacity. This will also save 1.2 million tons of imported oil per year.

He said the plant which was planned earlier would have been commissioned by 1982-83 but the delay was caused by financial constraints. He said the Government will prepare plans for another such project after the start of work on this project.

Mr. Munir Ahmed Khan said the KANNUP after a short difficult period, is on the line again and is generating power.—PPI

CSO: 5100/5704

PHILIPPINES

SECURITY AT BATAAN NUCLEAR PLANT INCREASED

HK010021 Manila Far East Broadcasting Company in English 2330 GMT 31 Aug 82

[Text] The Bataan nuclear plant and other government installations in the province were placed under tight security in the wake of reports that subversives will blow them up as part of their nationwide terrorism, strikes and bombings this month. The export processing zone in Mariveles was also placed under heavy security. Also heavily guarded are the government arsenal in Limay, the two explosive plants in Limay and Balanga, and the oil refinery in Limay, which is the largest in the country. Bataan PC [Philippine Constabulary] commander, Lt Col (Benjamin Feliciano), said combat-ready troops have also been deployed in strategic locations in the province. Seaborne patrols were also organized to cover Bataan's coastal areas, particularly the shorelines where the installations are located.

The security measures in Bataan were part of the nationwide alert ordered by Armed Forces Chief Gen Fabian Ver to forestall the subversive plot to create nationwide chaos, leading to the seizure of the government.

Meanwhile, detained labor leaders Felixberto Olalia Sr and Crispin Beltran, who are facing charges for alleged subversive plot, denied the charges against them yesterday before the Supreme Court.

The high court heard their petitions for bail. Government lawyers led by Solicitor General Estelito Mendoza opposed the bail on grounds that persons detained under presidential commitment order are not bailable. Supporters of Olalia and Beltran held a demonstration in front of the Supreme Court. The high court gave the defense and the prosecution 10 days within which to submit their respective arguments, so the court can decide the bail issue.

CSO: 5100/2246

NUCLEAR ENERGY SYMPOSIUM AT PAKS

Budapest ENERGIA ES ATOMTECHNIKA in Hungarian No 12, Dec '81 pp 521-536

[Article by Laszlo Kapolyi, academician, deputy secretary of the Ministry for Industry: "Second Nuclear Energy Symposium Held at Paks, 10-12 Sept 1981]

Introduction by ENERGIA es ATOMTECHNIKA

[Text] According to preliminary information, the symposium, organized jointly by the Paks Atomic Powerplant group of the Scientific Association for Power Engineering and by the Energy and Chemical Equipment Section of the Scientific Association for Machine Building, was identified as: preparation for the commissioning of the VVER-440-type nuclear powerplant units and experiences gained during that period.

Its purpose was to provide an opportunity for Hungarian and foreign experts to share their experience and to further their professional education in the following, detailed fields. The subject fields of the symposium were as follows:

1. Activities before the physical startup:
Pressure tests of the primary cicuit and its cleaning by circulation;
Testing and functional examination of the related systems;
First revision, thermohydraulic testing and second revision of the installations;

2. Physical startup of the unit:
Preparation required for loading, loading of the fuel and bringing the unit to criticality;

3. Power engineering problems in starting up the unit:
Increase of the performance to the nominal performance level, including measurements and checkup tests to be carried out during this period;
The 72-hour test operation of the unit and warranty measurements; and

4. Experiences gained from the operation.

The schedule of the symposium follows: Istvan Varga, secretary-general of the Scientific Association of Power Engineering, made the keynote speech.

After the presentation of Academician Laszlo Kapolyi, secretary of state of the Ministry of Industry, in plenary session, entitled "Preparations for the Commissioning of the First 440-MW Unit of the Paks Atomic Powerplant," the participants of the individual subject fields discussed the submitted and distributed papers on the basis of the general reports and supplementary information provided by the authors.

The following individuals served as chairmen and rapporteurs of the specific subject fields:

Subject Field 1/A: Chairman, Gusztav Jancsik, deputy director, State Supervisory Agency for Power Generation and Safety Technology (AEEF)
Rapporteur, Pal Nyerges, department head, AEEF

Subject Field 1/B: Chairman, Gyozo Verle, Electric Powerplant Investment Enterprise
Rapporteur, Pal Nyerges, department head, AEEF

Subject Field 2: Chairman, Zoltan Gyimesi, director, Central Research Institute of Physics
Rapporteur, Jozsef Vigassy, scientific collaborator, Central Research Institute of Physics

Subject Field 3: Chairman, Dr Tamas Zettner, director of Production, Hungarian Electric Works Trust
Rapporteur, Istvan Banyai, deputy chief section head, Hungarian Electric Works Trust

Subject Field 4: Chairman, Jozsef Ponya, general manager (Paks Atomic Powerplant)
Rapporteur, Andras Donko, group leader, Paks Atomic Powerplant

The conclusion was presented by Academician Gyorgy Vajda, deputy director of the National Atomic Energy Committee and director of the Electric Power Industry Research Institute. After the technical discussions, the folkloric dance group of the Szekszard Cooperative presented an excellent cultural program, which was very well received by both the domestic and foreign participants of the symposium.

Preparation for Kapolylon Start-Up Preparations

In the name of the Ministry of Industry and the Scientific Association for Power Engineering, I welcome with warm regards all the participants of the symposium. I feel highly honored to have this opportunity to present my thoughts as an introduction of the symposium, held on the eve of the commissioning of the Paks Atomic Powerplant--an event of epochmaking significance for power engineering and for engineering progress in Hungary.

You do not have to be told that like all national economies of the world, the national economy of Hungary is also searching for its proper place in a changed environment after the epochal change in worldwide economic relations. Energy and raw-material policy represents a field of decisive importance in this search. During this, the structure of power generation has changed more than at any time in Hungarian economic history, especially since liberation. Considering either the modifications or the internal structure of the long-range global requirements, the extent of these changes represent the advent of a new quality. The construction of the Paks Atomic Powerplant plays a decisive role in this change of quality, this modification of power-generating technology.

At the beginning of the 1970's, for example, long-range plans for the 1980's reckoned with a total electric energy requirement of 75 to 78 billion kWh, predicting a level of more than 130 billion kWh for the turn of the millennium. The level for the 1990 segment is now set at 42 to 44 billion kWh; the requirement is not expected to exceed 62 to 65 billion kWh by the turn of the millennium. Calculations--or, actually, rules of thumb--that yielded good results previously about the doubling of the energy requirements every 10 years as indicated by earlier experiences, had to be modified. Results of the current calculations indicate that these requirements do not increase by even 50 percent every 10 years. Recognition of this between 1980 and 1990 caused the cancellation of an installed capacity of about 5,000 to 6,000 mW. This magnified greatly the relative importance of the construction as a source to be created, because until 1990 we do not contemplate building any other power source except the Paks Atomic Powerplant and electric energy to be imported from the Hmelnicki Atomic Powerplant.

At the same time, we are attempting to assert two main principles in the power generation system. First, the efficiency of the power economy should be improved to the highest possible extent; as far as possible, our energy rationalization program, primarily in the field of distribution and consumption, must be accelerated. According to the second principle, we must emphasize in the structural change very rapidly the viewpoint that as far as technology permits it, hydrocarbons, in particular petroleum, should be eliminated from power generation. This may be achieved by improving the level of refining mineral oil within the shortest possible time. This also increases the relative importance of Paks in the electric power system.

This change of structure is shown in figure 1. As shown, when nuclear power generation appears, the hydrocarbons are regularly losing out in the energy-carrier consumption of the electrical power industry.

A significant element of the power strategy is that in the future when we want to enlarge our electric power production capacity, we must rely primarily on nuclear energy and coal. In principle, we can assume that up to 1990 the structural change has been decided; for the period after 1990, we must consider alternative possibilities presented by coal and the atom. However, if possible we should not allow these two sources to compete against each other, but, relying on the emerging new sources, we should accelerate the rate of reducing hydrocarbon consumption. Such a change will result in fundamental modifications as far as the overall power-generating industry is concerned. To the extent that nuclear power enters the picture, a technological basis should be developed within the cooperative system to satisfy peak energy demands. Thus, it will become necessary to realize as fast as possible the power-storing plant that has been preached.

The joint action of these three factors--the moderation of the rate of growth of the demand, the structural change of resources and, in the long range, basing the energy-carrier consumption of the electrical power-generating industry on nuclear power and coal--outlines how these two sources will be able to survive side by side and how they should participate in the system. The coal-based industry must participate primarily in resolving the problem of remote heating of large cities and, with the help of interconnected heat- and electricity-generating systems, providing remote heat to Budapest, Miskolc, Gyor and Pecs, while the nuclear powerplants will enlarge primarily the condensation-based fundamental powerplant system.

As a result, the participation of the Paks Atomic Powerplant will become an increasingly important factor in the national system because the rate of growth of the demand will slow. A new technological culture will appear. It is not sufficient any more to approach the problem of the long-range role of the nuclear power generation from the supply side but it is absolutely necessary to take into account to what extent the Hungarian industry will be able to participate in the construction program of the nuclear power-plant. In the case of both coal and nuclear energy, construction of the power-producing machinery and control technology are considered. These large-scale changes demand the theoretical and practical background, the high-level professional expertise that the domestic power-generating industry has possessed and on which it has been able to rely at any time to carry out its task.

In the case of Paks, it has been necessary to rely on an international division of the duties as it has not been experienced previously in the history of Hungarian industry. We had to rely on such an international distribution of labor by letting other countries, in addition to Hungary, participate in this international division of the tasks--most of the socialist countries serving as pioneers and, if you will, somewhat like beginners. Thus, the first unit will create the experimental basis; it will be part and parcel of the information data system on which the long-range nuclear powerplant construction program in Hungary will be based. From this point of view, we are not dealing simply with the startup of a unit but we enrich the informational material of people who shape, control and create the power-producing industry; these experiences will serve as the basis for future programs.

The realization of Paks--and also the rate of execution--plays a decisive role in the strategy of power-generating policy, coordinated to economic political goals. For this reason, the subject of this symposium is important in terms of how fast Paks can be brought on stream. In this connection, we must frankly look each other in the eye and admit that we have not been able to carry out the construction of Paks as far as we originally deemed possible. The currently accepted timetable--which foresees the startup of the first unit by the middle of next year (1982)--is considered to set a realistic deadline; we must mobilize all our will, our spiritual and physical forces to fulfill it.

Startup at such a set rate is needed because any further delay will result in additional hydrocarbon consumption. It is well known that throughout the world every attempt is made to avoid as far as possible the use of hydrocarbons, in particular crude oil derivatives, for the generation of electrical energy. Use of crude oil exerts a strong negative effect on the external trade balance of all countries, including Hungary. Therefore, it is important to maintain the required rate without fail. The timetable is tight but realistic. The period from pressure testing to the startup of operation, as indicated in figure 2, implies that our forecast agrees with earlier Soviet, Bulgarian, GDD and Czechoslovak experiences. The period from the physical startup to the beginning of operation will also follow a tight but technically realistic program. It is very important to follow the pertinent timetable without fail. According to the earlier concept--when we considered using several power supply sources until 1990, because according to the previous plans, we expected that the Bicske thermal powerplant with 1,5000 to 2,000 MW, the Gabchikovo hydroelectric plant, electrical energy imported from Hmelnyiczki and the Paks atomic powerplant will be completed--an eventual delay would not be as important as today when the individual units of the Paks atomic powerplant represent the most reliable power sources until 1990.

It is very important that when we start the power production, we enforce a safety concept that, as far as requirements are concerned, passed through the same dynamic evolution as the technical side of the nuclear powerplant itself. The Austrian powerplant illustrates the burdens resulting from these safety requirements. When the powerplant will be started up again, it will be necessary to spend an additional estimate of 5 billion schillings for updating the safety features of the power plant, to ensure that after suitable modifications the earlier construction satisfies the current safety requirements.

During the commissioning of the Paks plant, a wide range of operations is needed, because until the power generation 200 systems must be started up and 30 percent of the overall system must be set in operation even before the first pressure test (fig. 3). This requires very close collaboration between the Powerplant Investment Enterprise, the Paks Atomic Powerplant Enterprise, Atomenergoexport and the pertinent Hungarian institutes. The number and the international character of the participants in the startup operations also reveal the very broad international division of labor in energy construction program. It represents perhaps the best example of the technological basis of the socialist economic integration.

From the technological viewpoint, the commissioning operations present a novel aspect: The Paks Atomic Powerplant Enterprise had to assume responsibility for this task in contrast with earlier powerplant construction practice, when the construction company took care of the startup operations. Startup is an exceedingly complex task. We will not be able to solve these problems if we do not approach them imbued with the idea that creative people are working toward a common goal; imaginative intentions and a strong team spirit will create a golden bridge of understanding between the selfish interests of the enterprises. A major task of this size cannot be accomplished by rules and regulations alone, without considering the human side, the collaboration and cooperation of experts. I do hope that this symposium will make a significant contribution toward the further development and strengthening of human relations and fellowship. The already-mentioned enterprises do not work alone during the commissioning operations; they can rely on assistance from the Central Research Institute of Physics or the Electric Power Industry Research Institute. These institutes represent a reliable and internationally recognized basis, not only for the power-generating industry but for the Hungarian scientific life as a whole and, more specifically, for the scientific areas related to nuclear engineering.

The people who participated in the task received excellent preparation. To illustrate this, of the 1,600 authorized staff positions, half received specialized training abroad and about 50 percent received similar training in nuclear technology within the country. Of them, 22 percent of the total staff (fig. 1) received training in Hungary from a nonemployer. This proves two things: On the one hand, this nuclear powerplant will be started up by experts, on whom we can rely not only for the commissioning of the first unit, not only for 1,760 MW, but also for handling additional units. On the other hand, we have developed a domestic scientific background, on which we can rely for further training. This can be attributed to the experts and scientists in Hungary--in the institutes of the academy, in industry--recognizing that in the current period of scientific and technological revolution, nuclear powerplants and nuclear technology cannot be absent from Hungarian power generation. Even though we somewhat embittered each others' lives with a 5-year delay--with respect to the initiation of nuclear powerplants--the history of power generation demanded this period. However, its advent required suitable experts and they have been trained at the proper time.

Considering the start of the operation itself, it is well known that a law concerns the application of nuclear power generation and its safety in Hungary. A committee responsible for the commissioning of the Paks Atomic Powerplant has been appointed; it will enforce these rules and regulations.

The radiation protection and safety of the environment are guaranteed by a multiple system. On the one hand, the Paks Atomic Powerplant Enterprise operates processes that set a specific limit for the emissions. These systems are used to control the atmospheric contamination, the pollution, of the ground and the river basin, and to check the whole water cycle; in addition, meteorological data are recorded and any eventual release is checked, comparing the findings with limit values in every case. Thus, the safety system coordinated with the safety concept provides in every case a record to the emissions (fig. 4).

The second control system (fig. 5), which actually works independently of the previous one but again controls the system completely and guarantees a thorough safety and protection, represents the intake control by the individual agencies, whereby the limit values are set, including again the control of the meteorological conditions, the atmosphere, the ground, the water cycle, the biosphere, thus the whole biological environment with the intervention of the official agencies in cooperation of the state supervisory system. In the case of Paks, this means that the substantial increase of the investment burden completely satisfies the safety considerations. The authorization process of startup is scheduled in such a way that startup is not approved until the initial conditions are checked out by means of a specially defined systematic process, which takes all pertinent factors into consideration (fig. 6).

It is important that people participating in this symposium discuss their ideas so that when they leave, they will not simply convince each other that the safety philosophy operates correctly and all safety regulations have been fully considered. Rather, they should express this viewpoint in professional circles and in society at large with the needed emphasis. It is well known that many misunderstandings are encountered, many gossipy stories are heard about nuclear technology. In this connection I would like to examine the path selected by the Hungarian power-generation policy.

Supporters of the so-called soft strategy usually raise objections against nuclear technology but also against the increased consumption of coal. In their opinion, the rate of growth of the economy should be restricted to the level whose energy demands can be fulfilled primarily with renewable natural resources and which do not present a burden to the environment. As with industrialized countries in general, Hungary cannot use this approach. Therefore, we must choose the path of hard strategy, taking advantage of nuclear technology, coal and hydrocarbons in the form of a combined strategy for the energy and raw-material policy. The safety philosophy and environmental protection concept that we apply must fully ensure that the emissions from the technological system--interpreting individually the sources of contamination--are kept within the limit values to be expected at the current state of the art and that the intake is monitored continuously by means of a suitable control system.

I want to express my best wishes to this symposium, organized to provide an opportunity for discussing the commissioning of the nuclear powerplant. This confirms that a new technological discipline was created in Hungary, representing the latest stage in the history of Hungarian power generation.

Your achievement is similar to the creation of the unified Hungarian electrical energy system. At the last session of CEMA's Permanent Electrical Energy Committee, the representatives of all countries stated that the technological activities, the underlying concepts and the level of power generation achieved by Hungary are of an outstanding quality; Hungary participates as a technical partner in this cooperative electrical energy system. The construction of the Paks Atomic Powerplant is a worthy addition to the many achievements that characterized the Hungarian powergenerating industry during the last few decades. The role that the Hungarian energy-generating industries and workers assumed is equal to the challenge presented to the technical intelligentsia; it indicates that we work as a part of an economy searching in a changed environment to find its place in the world economy. This search follows a course of quality assurance that never presented such strict conditions to us, perhaps since 1945, in its criterion system. We had to deal with the technological tasks of a national project, the magnitude of which can be compared only to the nationalization of the industry. The reconstruction after 1945, the collectivization of agriculture or the consolidation after the counterrevolution.

Without such a national accomplishment, the existence of the whole economy could be endangered; this question is of vital interest for all of us. In this light, this quality assurance approach will be followed. The Hungarian economy will fulfill these quality requirements during the coming decades; this is vouched by the fact that the technological intelligentsia, and more specifically the community of powerplant experts, is always able to solve the tasks that face us at certain periods of economic development. The critical task of the current period of economic development--specifically, of the Sixth Five-Year Plant and the portion concerning power generation--is the timely construction of the Paks Atomic Powerplant. I am asking the participants of this symposium to lend us their assistance and creative support to achieve this.

SUBJECT FIELD 1/A

The six communications classed in subject field 1/A contain two Hungarian and four foreign papers: Two are the work of Czechoslovak and one each of Finnish and Soviet authors. In summary, the following main considerations may be extracted from these papers.

In order to start the operation of the first unit of the V-1 nuclear powerplant at Bohunice in Czechoslovakia, following the example of the Soviet VVER-440-type plants already in operation, Czechoslovakia made an interstate contract with the Soviet Union, including the following points:

--provision of documentation, programs, operation instructions;
--direct participation of Soviet experts; and
--supply of various materials.

Villiam Ziman reported on the tasks arising from startup of the operation, training of the staff and personal and material conditions. The startup operations were divided into two phases at Bohunice:

--nonactive operations (scubbing, strength and tightness tests of the system, pressure tests of the primary circuit and scrubbing of the circulating system, first revision, hot tests, second revision) and

--active operations (physical startup, power generation, startup, 72-hour-long complex test operation).

The paper presents a good survey of the logical order of the startup of production, the structure, activities and relationships of the control and operating groups needed to carry out the individual processes and phases. The extent and complexity of the structure are similar to the system developed at Paks. (It is unfortunate that--perhaps because of space restrictions--the paper does not discuss or summarize the positive and negative effect of the experiences). The audience of the symposium probably would have been interested to know:

--to what extent the plan has been modified during installation;

--to what extent it was possible to fulfill the quality assurance requirements during the operational start-up;

--to what extent it was possible to ensure the independence and effectiveness of the quality control group; and

--what official control agency or authority (or authorities) functioned during the individual phases of the licensing process; what was their relationship with enterprises carrying out operations and, most of all, with the management of the nuclear powerplant operators, the vendors.

In connection with points A and B of the chapter referring to the thermohydraulic tests, two questions arise:

1. After evaluating the experiences of the Harrisburg accident, is the adjustment of the safety valve (Sempell) of the volume-equalizing container and the joint functional testing of the bubble container considered suitable?

2. What was the nature of the reconstruction of the load system of the pulse valves when the safety valves of the two generators were adjusted?

The next paper describes startup conditions and prerequisites of the systems and of the overall unit of the Loviisa II nuclear powerplant; it was prepared by Skytta, Lamroth and Kinnunen, the representative of the Finnish company Imatran Voima Oy. As known, units 1 and 2 of the Loviisa nuclear powerplant, which are also of the Soviet VVER-440 type, differ from similar units built in the Soviet Union and in the socialist countries inasmuch as this nuclear powerplant was built with a double-walled containment building, provided with ice condenser. Enterprises from Finland and other Western countries collaborated closely in the construction.

The paper emphasized an important requirement of the startup and initial operation period; the cleanup program of the individual components and systems. These operations follow each other in a prescribed order. The structure and operation of the agency authorizing the initial operation, as described in the presentation, appeared simpler than the organization developed in our country. In this case, the similarity is due to the Finnish Ministry of Commerce and Industry, as the licensing agency, asking the opinion and testing reports of several supervisory authorities: the Institute for Radiation Protection (IRP), advisory agencies such as the

Atomic Energy Council, the Advisory Committee for Radiological Protection (SSV) and the Nuclear Safety Council (ATT), before issuing the license.

The prerequisite for issuing the operating license depends on three reports approved by the advisory agencies, namely:
--the safety report reflecting the final state;
--the so-called preparedness (or evacuation) plan; and
--the summarized program of periodic inspections.
Of special interest is the second appendix, which contains the list of licensing operations (amounting to 27) in chronological order for Loviisa unit 2, together with the block diagram of the operation licensing process. We learn from this that only 7 months passed from the issuance of the license to load the fuel (19 May 1980) until the authorization to raise the power to the 100 percent performance level (12 December 1980).

In his presentation, Istvan Banyai surveyed the development of NUSS (Nuclear Safety Standards) of the International Atomic Energy Agency. The IAEA developed this safety series for its member states--primarily for the benefit of developing countries using nuclear power and building nuclear powerplants, although they have not yet acquired sufficient experience--in order to ensure that standard regulatory guidelines will be enforced in the countries in question.

In Hungary, the regulations and guidelines of the NUSS series are published by the Documentation Center of the Hungarian Central Technical Library under the supervision of the National Atomic Energy Committee. The IAEA issued safety regulations on the basis of a wide-ranging committee activity in five main areas:
--regulations concerning the governmental organization for the regulation of nuclear power plants (symbol G);
--siting (symbol S);
--design (symbol D);
--operation (symbol O); and
--quality assurance (symbol QA).
The regulations (codes) in these five main regulatory areas are supplemented by guides containing additional details about the regulations and providing useful assistance for developing the internal structure and legal regulatory system of the member states.

The paper about the principles of quality assurance of the domestic nuclear powerplant (its authors were Pal Nyerges and Zoltan Szonyi, staff members of the State Supervisory Agency for Power Generation and Safety Technology) discussed the requirements during design, fabrication and installation and also during startup and operation. With the help of simplified diagrams, the paper illustrated the interrelationship of the agencies, including the design, construction and supplying relationships derived from the Soviet-Hungarian supply contract.

As a coauthor, I would like to emphasize a fact mentioned in the paper. The Ministry of Industry is attempting to strengthen the quality assurance organization of the construction of the nuclear powerplants within a suitable legal framework, taking into account that we are confronted with many problems not yet resolved or eliminated. Such problems are encountered in all developing countries, whenever the nuclear powerplant is turned over to the operator in not quite turnkey condition and whenever the technical and economic interests and the state of development of the country justify the largest possible participation in the construction.

The experiences gained from the operation of nuclear powerplants built abroad with the technical assistance of the Soviet Union have been summarized in the paper submitted by Malinin and Katunov, representing the Soyuzglavzagranatomenergo (All Union Association of the Energy Generating and Electrification Ministry of the Soviet Union). The Soviet Atomenergoexport concludes a special bilateral supply contract with the importing countries for starting up the operation of the VVER-440-type nuclear powerplants, guaranteeing in this contract that all basic conditions absolutely necessary to ensure the safety at startup and during the subsequent operation, will be fulfilled.

The assistance and supply by the Soyuzglavzagranatomenergo is provided through highly qualified Soviet experts who are sent to the nuclear powerplant for 1 to 2 years. Depending on the progress of construction or the state of the operation, the presence of the Soviet experts and their organizational structure varies, according to the requirements of the field in question, and their stay may extend 1 to 2 years.

The fields of activity of the chief experts of the advisory or operating groups cover the primary and secondary circuits, the control instrumentation and automation, the electrical installations and the water-chemistry and radiochemistry systems. Members of the operating group gained considerable experience with the powerplant installed and operated in the Soviet Union and also in the German Democratic Republic, Bulgaria and Czechoslovakia.

There are two main findings in the paper. The first one is according to the experience gained in the already mentioned powerplant the safety of the operation of the unit demands the presence of the operating group (at a strength of about six to eight persons) even during the subsequent period, during the years following startup of operation.

The second finding also refers to this time period. It appears in the form of collaboration or mutual relationships; the so-called partnership principle is used in the German Democratic Republic and the group principle in Czechoslovakia. In the paper, the first principle is preferred.

Finally, I would like to mention the statement related to the qualification, training formation, exercising, continued education of the operating personnel, which keep attracting increasing attention, in particular since the Harrisburg TMI-II accident, which caused considerable excitement throughout the world. I agree with the authors that the Soviet experts in the operating groups deserve great credit for the fact that the nuclear powerplants that they started up and are operating, do indeed function safely and reliably, while the utilization factor of the installed capacity exceeds 70 percent, or even 80 percent in the case of units 1 and 2 of Kozloduy.

SUBJECT FIELD 1/B

Of the nine papers in subject field 1/B, six are the work of Hungarian and one each of Czechoslovak, Finnish and Soviet authors. The main lines of the content of the papers are summarized.

The paper presented by Dr Robert Taubner, Zsolt Texzy and Dr Lajos Voross, researchers at the Electric Power Industry Research Institute, described the instrumentation for the integrated leak-tightness measurement of the hermetically sealed building system of the Paks Atomic Powerplant. One of the most important, fundamental criteria of the safety concepts developed for the VVER-400-type nuclear powerplant built at Paks, is the assurance of the leak-tightness of the hermetically sealed system at a suitable level. The National Startup Committee prescribed successful performance of the so-called integrated leak-tightness test as one of the conditions for the issuance of the startup license. Investigators of the Electric Power Industry Research Institute have been making preparations for years to carry out this test; the paper represents their detailed study.

The basic requirement concerning the absolute pressure measurement principle--widely used also internationally--are reproducibility, accuracy and reliability. This applies to the whole instrumentation system, the measured characteristics such as the internal volume pressure, temperature, moisture content, time and also the collection and statistical processing of the measured data. The paper reported the results of the preliminary site inspection and the measurement program, supplemented by a list of the instrumentation to be used, a diagram reflecting the relationship between the specific leakage and the relative error limit, and a schematic diagram of the leak-tightness measurements.

The paper reflects a careful study, which is especially significant because this is the first time that the integral leak-tightness measurements of hermetic systems according to the requirements of the new safety concept have been carried out in Hungary. It is regrettable that no report has been presented at the symposium on the local leak-tightness measurements (leakage tests of orifice closing systems, of piping and cable penetrations) that precede the integral leak-tightness tests. It is not possible to sense the relationship of these two factors: the effect of local leakage on the integral leak-tightness side by side.

The next paper, which discussed the positioning of diagnostic sensors in the primary circuit needed for the startup measurements of the Paks atomic powerplant, was presented by Elod Hollo, Peter Siklossy and Moklos Kovacs, staff members of the Electric Power Industry Research Institute and the Paks Atomic Powerplant. Diagnosis of vibrations in the primary and secondary systems of the nuclear powerplant is not only a novel testing procedure in Hungary, arising during construction of the first nuclear powerplant, but it is part of an extended research and development activity aimed throughout the world to eliminate deleterious mechanical vibrations.

The investigation primarily covered the reactor container and its components, the main portions of the primary loops and their most important systems and the direct or indirect measurement of the vibration pattern of the turbogenerator unit. The study considered the solution of positioning the sensors of the vibration-diagnostic system in the primary circuit of the first block of the Paks Atomic Powerplant, their possible gradual extension and eventual modification. In the first unit, 41 instruments sensing the acceleration of vibrations and 9 pressure-fluctuation sensing instruments were installed. The measurement program was briefly outlined in the paper, mentioning the more advanced concepts planned for other units of the powerplant, and potential collaboration with CEMA countries in this field.

In their study, Karoly Pahota, Peter Tilky and Andras Wagner, staff members of the Chemical Construction Organization, the Paks Atomic Powerplant and the Electric Powerplant Investment Enterprise, considered the examination, pressure testing, circulating, scrubbing and functional testing of the water-purifying systems. The preparation and the handling of media and solvents in amounts and at a level of quality satisfying the technical requirements, were ensured in the primary circuit by:

--the pure condensate system;
--the chemicals storage and preparation system;
--the primary-circuit emergency water and boron-regulating system;
--the nos. 1-6 special water-purification system;
--the system handling the decontaminating solutions;
--and the liquid-waste storage system;
and in the secondary circuit by:
--the condensed-water purification system.

Many mechanical and chemical tasks arise while this water-purifying system is built, including execution of the washing, scrubbing and internal cleaning tasks, creation of temporary units and circulation loops, mechanical testing and revision of pumps and installations; they usually became necessary while these operations are carried out at the site. Because of changed circumstances, urgent action is often required of enterprises involved in planning, construction and operation, the Soviet experts and, last but not least, by the Paks Atomic Powerplant Enterprise operating the unit.

Realistic problems from previous experience are cited in this paper; most of them are due to errors in design and execution, insufficiently fulfilled quality-assurance requirements and a certain slackness in the control and inspection activities. It is a special merit of the study that it presents proposals for solving or eliminating these problems.

In his paper, Herman Miroslav, representing the Czechoslovak Scientific Research Institute for Nuclear Power Generation, reported on the materials testing carried out on the main components of units 1 and 2 of the Bohunice

V-1 nuclear powerplant. The following main components were tested: the 500-diameter main circulation piping, the connecting piping of the volume-equalizing container, the main closing valves of the 500 piping, the hydraulic sections of the main circulating pumps, the steam generators, the volume equalizer, bubbling container and the filters of the special water purifiers.

The structure of the agencies and organizations directly involved in the control, in which the staff and the consultants of the nuclear powerplant play a major role, is described in the paper. Among the testing methods, the visual surface examination techniques, with a manipulator connected to a TV camera, has been preferred, since it is the only method to approach in a reproducible manner the individual tests after startup of the operation.

The control test for power startup on these components was carried out in three stages:

--after the pressure test of the secondary circuit;
--after the first and second pressure tests of the installations, at the time of the first revision; and
--after the third pressure test, at the time of the second revision.
The time needed to execute the control tests was affected by the demand to provide thermal insulation and to purify the surface to be examined. On the other hand, the three-stage control operation described in the paper, decreased the time demand of the first and second revision.

The following problems have been discussed in the paper, indicating that they still await solution: ensuring the superficial cleanliness and fineness of the stainless-steel systems and piping, installation of thermal installation that can be handled easily and rapidly, especially at locations exposed to radioactive radiation.

Finally, the paper emphasizes the importance of recording and storing documentation, to make it available for periodic rechecking. The symposium should give its complete approval to the proposal stated in the paper concerning the mutual exchange of experiences and information, the computer-based recording and processing of results by the CEMA countries.

Janos Gado, candidate of physical sciences and a staff member of the Central Research Institute of Physics, discussed the core-physics calculation of VVER reactors. The department of reactor physics of the Central Research Institute of Physics adapted the BIPR-5 computer program of the Moscow Kurchatov Institute for the Paks Atomic Powerplant. The paper implies that at an acceptable safety margin, the BIPR-5 program is well suited to plan loading, reloading and operational processes.

Programs are available at the Central Research Institute of Physics; these may be used to determine other data of programs used to calculate the whole reactor core (lag, boundary parameters, kinetic parameters). Results of the core physics calculations should allow establishing a more stable basis to estimate the service life of the campaign, the unevenness factor of the heat distribution and the burnout at the end of the campaign.

The paper also considered questions of economical character related to the BIRP program of the microdistribution within the fuel-element bundle; the related coarse-net process, currently under development; and the determination of the isotopic composition of fuel element bundles. The BETTY computer program may be used to determine the relationship betwen the isotopic composition and burnout and between the neutron-physics parameters and burnout.

In the paper presented by Tuominen, Pietikainen and Kutramoinen, representing the Imatran Voima Oy Company of Finland, the steel containment and startup of the connected system was examined. The Loviisa nuclear powerplant has been mentioned; it has been also stated that the VVER-440-type system under construction at Paks has a different design for the safety building (containment, system of leaktight rooms). The integral air-tightness testing of the sealed rooms was also mentioned; in this connection it has been pointed out that no report about the local tightness testing has been submitted to the symposium. This omission has been remedied in part--albeit in a different respect--by this paper, since in the detailed description of the ice-condenser containment system built at Loviisa, the leak-tightness testing of conducts, personnel and safety locks and various other penetrations is mentioned.

Bela Farkas and Gyorgi Makadi reported on behalf of the Paks Atomic Powerplant on the inspection plan for incoming goods and on experiences gained in the field of nondestructive testing. The purpose of the nondestructive testing specified for the incoming goods control test is to make random checks about the adequacy of the main components, piping and armatures of the primary circuit. The study has been extended to cover the base material of the components and their welded joints. The permissible discontinuities in the base materials and welding, their location and extent, were determined by nondestructive testing.

The ultrasonic method was used to an increasing extent, in addition to conventional radiographic, penetration and ferrite content measurements, for studying austenitic primary components, welded piping joints. The Paks Atomic Powerplant carried out the ultrasonic tests for information. The reproducible incoming goods control tests represent the recording portion of the so-called zero state.

Based on experience, an attempt was made to render the incoming goods control tests even more reproducible and to develop further the ultrasonic testing techniques.

The next paper was submitted by Peter Nagy, a staff member of the Paks Atomic Power Plant. The Komplex Uran-2 information computing system for powerplant process control has been used in Hungary for the first time among the CEMA countries, with the construction of the Paks Atomic Powerplant after application within the Soviet Union. Its operation is controlled by SZM-2 computers. Its related systems are the M60 device, the Orion-M graphic representation system as hardware unit, the SEYVAL as an information subsystem --which will be realized only after the test operation--and the HINDUKUS installation, which takes care of the internal control of the reactor and will provide valuable information for the Komplex Uran system. The paper emphasizes that the fulfillment of the demand of the Hungarian-language presentation posed a special problem for the people working on startup.

The paper submitted from the Soviet Union by Kapunov, entitled "Organization and Execution of Fuel Reloading and Planned Revision in a VVER-440 Reactor Unit of a Nuclear Powerplant," described two types of reloading. The first type is carried out annually when one-third of the burntout fuel removed from the core is replaced with fresh fuel. At the same time the lattice is checked and intermediate-level repairs are carried out. The second type of reloading involves the complete removal of the internal components and the core. The system is rechecked and major repairs are carried out.

On the Basis of experience gained in the Soviet Union, the first major (type 2) reloading of a newly commissioned powerplant is carried out during the 2nd year after start of the operation, after an operating period of 15,000 to 20,000 hours, together with checkup and major repairs. After that, type-2 reloading is scheduled only for every 4th year.

The paper states that in the course of the fuel reloading, the Soviet Union ensures the conditions needed by the client-buyer within the framework of technical assistance program. The technical assistance is provided on the basis of a contract between the Soviet party and the foreign-trade agencies of the client. The need for such a technical assistance based on a contract is justified in detail in the paper.

Briefly, this activity involves a large volume of design, organization and preparatory work. Not in the least, it lies in the interest of the client that its operating personnel, which does not yet have sufficient experience, will use suitable safety precautions to carry out this dangerous process.

Regardless of the type of reloading, experience indicates that the preparations and planning for the reloading operation may be divided into three periods. The first period--which starts as early as the first days of operation of the nuclear power plant--requires a 3 to 5 year period for the detailed planning of the revision and maintenance operations.

The second period involves the elaboration of the required documentation, the organization of the devices, materials, spare parts and work groups. It should be completed at the latest 25 to 30 days before shutdown of the reactor to be reloaded. The third period is actually the licensing period. At that time, the documents are checked and approved by the competent authorities.

According to current experience, the time requirement for the first type of reloading is 30 days and for type 2, 55 days. The decrease of the shutdown period depends greatly on the quality of the work carried out during the preparatory period.

SUBJECT FIELD 2

Eleven papers were submitted for subject field 2, including seven representing the work of Hungarian authors; one was submitted by a Finnish, one by a GDR and two by Czechoslovak authors. Four papers are of a general nature, involving measurement programs. Because of their subject, they can be compared. Two other papers discuss similar problems, namely, the measurement of mixing in the mixing chamber, and the effect of the mixing. Therefore they can be jointly summarized. The other papers cover relatively independent subjects; therefore we will describe them individually. In order to emphasize the interrelations, we will discuss the papers in a certain logical order.

Among the papers with a comprehensive character, the article by IVO engineers, V. Sorri and H. Lamroth, entitled "Organization of the Fuel Loading and Physical Startup at the Loviisa 2 Nuclear Power-plant," should be mentioned. Of course, they not only describe how the work was organized but also discuss the unexpected events encountered during the work and list chronologically the activities to provide protection against these events. The events described in the paper covered about one-half year during the 1980 calender year. The material contains a lot of useful information that might be of interest for the people involved in startup operations at Paks. The authors compared in a colorful manner the events with those during the corresponding phases of startup operations of the Luviisa 1 unit. Their precise, detailed work deserves appreciation.

Let us now mention from among the comprehensive studies the study of the VUJE engineers, S. Rohar et al., entitled "Experiences of the Physical Startup of the V-1 Nuclear Powerplant." In this paper, the emphasis is not on the way startup operations were carried out; rather, the startup measurement programs and the results obtained during measurement are compared not only with each other, as the case of the two Bohunice units, but with other Bulgarian and CDR VVER-440 units and even with the startup measurement programs of other reactor vendors.

The carefully compiled material contains information on detailed questions, such as the role of the measurements carried out with the RZEZ TR or the Csilleberc ZR-6 reactors in preparation for startup and in the tests with the BIPR-5 program. The large volume of measurements and calculation material has been effectively summarized in 4 tables and 11 figures. These may be used not only for the preliminary planning of physical startup but also in the evaluation of certain questions related to operations.

On behalf of Paks Atomic Powerplant, Physicist Laszlo Turi, department head, described to the international group of experts the physical startup program of the Paks unit 1 on the basis of the concepts as of spring 1981. The material was quite widespread and it was obvious that the program has changed in a number of detailed questions. Therefore, it would be desirable to hear more about these changes and the evolution of these concepts.

One of the work groups of the Central Research Institute of Physics accepted the assignment to prepare and to manage a portion of the startup measurements, certain specific thermohydraulic measurements of Paks unit 1. This portion includes several measurements, which are scheduled to be carried out during physical startup. The paper prepared by Dr Laszlo Szabados, division head, and his associates summarizes all the activities and the pertinent preparatory work for which the thermohydraulic department accepted responsibility during various phases of startup. The concepts and studies described agree with the previous paper.

Two authors from the GDR, Dr G. Ackermann, professor at the Technical Universtiy of Zittau, and Dr H. Melhior, engineer at the Ministry for Higher and Technical Education in Berlin, submitted an interesting article. The title of their paper was "Thermohydraulic Studies during Startup of Operation with the examined VVER-Type Pressurized Water Reactors." The paper examined the mixing of the primary cooling water flowing through the individual loop and its effects. The conclusion of their study was that the core is uniformly cooled, even if the number of loops in operation is smaller. However, if the steam generator is disconnected only at the secondary side, then an asymmetric temperature field is created in the water entering the reactor core, which causes a distortion in the performance distribution. The authors attract attention to the fact that in the lower mixing space, the mixing is far from complete. They urged additional plant measurements in order to determine more accurately the mixing factors and proposed taking results into consideration when determining the permissible reactor performance if the number of loops is reduced.

In the first part of their presentation, Dr Gyorgy Ezsol and his associates (Central Research Institute of Physics, Budapest) propose a combined evaluation method for the in-core thermoelements calibration measurements and for the determination of the mixing factors. It appears that the results obtained by the proposed evaluation method may be used for the purpose mentioned in the previous paper from the German Democratic Republic. In the second part of the paper, problems arising in the course of the measurements of the primary circuit flow were outlined; the preparation of the small-scale calibration experiment, which is under construction, were described.

J. Kott (Skoda Works) discussed in his paper an interesting subject area of the power engineering study of fuel elements.

Zoltan Pammer and Laszlo Szabo, engineers at the Electric Power Industry Research Institute, described their program system, which was developed to analyze the strength of bodies with a complex shape and stress, based on the finite element method. They illustrated this with the help of an application concerning a container study of the VVER-440.

Dr Sandor Benedek, senior scientist at the Electric Power Industry Research Institute, also described a computer program in his paper. This program was prepared to analyze transients in the primary circuit during operation and breakdown. For illustration, he presented an analysis in which one of the six main circulation pumps has broken down.

Dr Erno Petz and Albert Hetzmann, Paks Atomic Powerplant Enterprise engineers, discussed the control circuits of the first unit of the Paks Atomic Powerplant. After describing the structure from the viewpoint of instrumentation, they emphasized the questions important for preparing for operation, such as training of the instrumentation and control personnel and laboratory testing of the control circuits.

Physicist Dr Janos Valko and his fellow authors from the Central Research Institute of Physics described the application of the installation method for reactor physics parameters during physical startup. This system contains a CAMAC microcomputer. After summarizing the processes and signals to be measured, they specified the installation system and then described the computer program which controls the measurements. Finally, a computer program for calculating the value of reactivity was discussed.

SUBJECT FIELD 3

Of the 11 papers in subject field 3, Hungarian authors presented 3 papers. Of the articles from abroad, 6 were the work of Czechoslovak authors, 1 was Finnish and 1 originated from the German Democratic Republic. Since our goal was primarily to present practical experiences to assist in startup operations, this ratio was acceptable. It is a difficult task to highlight any of the papers because of present new knowledge and, what is even more important, communicate practical experiences to us.

The study by Sandor Desi and Dr Egon Szondi, who are working with the educational reactor of the Budapest Technological University, described the instrumentation used for the selective measurement of the radioactive rare gasses released with contaminated effluent air through the ventiliation stack of the nuclear powerplant. The application of such a system is justified by the need to track the radioactivity released from the nuclear powerplant and to identify the data collected in the course of measurements for environmental control.

The authors summarized clearly the functional structure and the services rendered by the system. However, the illustrations of the study are less satisfactory. It would have been desirable to present some transparencies and to illustrate the output of the on-line evaluation program.

The study of Zsolt Toth, Dr Zoltan Bessenyei, Laszlo Marcsa and Istvan Fugedi, engineers at the Electric Power Industry Research Institute was a very lucid presentation of the structure of the vibration-diagnostic system to be built at the powerplant. The authors are on the right track when they publish their own comments concerning the solution of practical problems encountered during construction. Such problems are, for example, extreme environmental conditions for amplifiers installed in the primary circuit or the high-current perturbances for the signal transmission.

In view of the fact that the vibration diagnostics already have a large international literature and that the authors are recognized experts of this field, it was to be expected that they would present the current state of vibration diagnostics with particular consideration of applications to nuclear powerplants in an introductory survey. Unfortunately, certain services considered fundamental for the operation of the system have not been presented. Thus, for example, the identification analyses have been mentioned in the paper only in one-half of one sentence.

Stefan Kacmary and Jozsef Ricani, staff members of the Scientific Research Institute for Atomic Energy at Jaslovske Bohunice, presented a concise survey about startup of the standard Soviet programs with the help of units 1 and 2 of the Bohunice nuclear powerplant. Within this subject, they discussed the thermohydraulic and physical startup and ascension to power. The experimental data-collecting and processing systems, described in a separate chapter of the study, which supply supplementary information, operating in addition to and in parallel with the standard process control system, are of special interest for Hungarian specialists.

In the concluding section of the study, the authors summarized their experiences in the following way:

--The developed inspection program must be considered a standard one.
--The inspection program must be carried out in its entirety.
--The amount of measurement parameters and the number of starting cycles indicated in the plan must be adhered to;
--The collection of qualitative data and information processing in the course of the physical and startup power ascension operations must be ensured.
--Every attempt must be made to ensure quality of the complex individual and partial inspections.

These statements should not be considered as experience but as a fundamental requirement. The rich and highly pertinent references of the study very well supplement the provided information.

The paper submitted by Ivan Jaros, another staff member of the Czechoslovak Scientific Research Institute for Atomic Energy, also examined the starting-up problems of unit 1 of the Bohunice nuclear power-plant, describing specifically the inspection method used to study the state of the main circulating pump and the detection of particles precipitated or released in the primary circuit.

The spectra presented in table 4 illustrate the inspection carried out with the presented vibroacoustical diagnostic system. Of special interest are the concluding points concerning the economic considerations of the application of vibroacoustic diagnostic systems.

One must agree with the author's conclusion that the CEMA countries should compile a catalog of diagnostic systems for nuclear powerplants. This is a very constructive proposition indeed; it means that information in this subject area should be kept up to date for the benefit of interested parties.

Jan Tomik, Stefan Vojtek and Stanislav Stanc, also staff members of the Czechoslovak Scientific Research Institute for Atomic Energy, indicated in their paper how the accuracy of the temperature measurements carried out laboriously and with great care in the primary circuit is guaranteed, in spite of the influence of meteorological factors. The question appears only to be a partial problem; however, the paper refers to a publication in ENERGIA ES ATOMTECHNIKA, nos. 5-6, 1979 (1), which illustrates its fundamental significance. The indicated extent of the inspection and the anomalies encountered previously and during operation, illustrate well how important it is to fulfill the testing and quality requirements concerning temperature measurements; this should be emphasized. The experimental results presented in the paper prove unequivocally the importance of inspection before installation and during operation.

Vlazej Losonski, another staff member of the Czechoslovak institute, described the peculiarities of the self-regulation of the reactor, which may be experienced in the course of the control processes at the ascension to power of the unit. The author started from the premise that the tests carried out at zero performance level are not sufficient to ensure the safe and economical operation of the nuclear powerplant, giving an excellent survey about the processes based on self-regulation tests carried out at the time of the power ascension of the Bohunice units. They were aimed at the determination of:

--the reactivity coefficient and differential effectiveness according to performance of the regulating cassettes and
--the thermal coefficients of the reactivity.

In the concluding section of the study, the author mentioned certain modifications carried out on the reactor; the safety compensation in the self regulation arises as a result of these modifications. It would have been desirable to obtain brief information about these arrangements, their character and effect.

Ivan Simerka, also a staff member of the Czechoslovak research institute, reported on the dynamic tests carried out on units 1 and 2 of the Bohunice Nuclear Powerplant, at the 35, 55, 75 and 100 percent performance levels. The conclusions drawn from the experience gained during the tests may be also expressed in the form of requirements.
--The faultless operation of the water-level regulators of the steam generators must be ensured.
--It must be ensured that the breakdown of any of the operating turbines will not initiate a transient fault series, which would result in the groundless breakdown of the other turbine.
--The continuous and troublefree power supply of the control system must be ensured.
--The effect of the adjustment parameters of the controls must be determined during preliminary tests.
The diagrams presented in the paper supplement the material quite well.

Josef Zadrazil and Josef Hermansky, similarly staff members of the Czechoslovak research institute, also studied the inspection of units 1 and 2 of the Bohunice nuclear powerplant. The extremely precise and detailed study described valuable practical problems about measurements of the hydraulic characteristics and about flow and pressure tests when the main circulating pumps were disconnected or have broken down.

A. Laukia and K. Porkholm, staff members of the Finnish Imatran Voima Oy Company, described the dynamic tests during the ascension to power of unit 2 of the Loviisa nuclear powerplant, including the study of the load response properties of the unit. The authors followed up in detail the states of drop of load, loss of the feed pump, drop of the reactor from the nominal performance level and main load reduction.

The study of the load response properties was extremely interesting. Its final conclusion was that the unit:

--is able to carry out a performance change of ±5% within 30 seconds at the 80 to 100 percent load range or

--is able to carry out a performance change of ±20 percent within six minutes.

In judging these data, it should not be forgotten that the level of control technology of the Loviisa unit is higher than that to be installed into the Paks Atomic Powerplant. The authors emphasized the importance of the discussed tests, not only from the viewpoint of suitability, safe operation, and verification but also for the training of the operating personnel.

Karoly Hegyi, degreed physicist and staff member of the Paks Atomic Powerplant Enterprise, described the complex diagnostic system to be installed in the Paks Atomic Powerplant. The system will include input in the primary circuit about:
--vibration of the reactor container;
--vibration of the main components;
--vibrations of six selected control and safety protection media;
--pressure fluctuations of the primary coolant;
--pressure fluctuations within the core;
--6-6 selected in-core detectors and ionization chamber noise signals; and
--6 operational thermoelement noise signals;
together with the installation of the previously discussed turbine bearing acceleration input into the secondary circuit.

The study summarized quite well the systems technology of the planned complex. It was mentioned that the detailed evaluation will be carried out on an R-40 computer. After an initial off-line evaluation, the system is to be transformed into an on-line measuring system.

The question arises in connection with the preceeding two statements why the output of the complex does not figure in the plans or, in other words, the author's casual remark that the complex would be further developed into an on-line measuring system should be further clarified.

In his study, Jukka Timperi, a staff member of the Oy Finnatom AB, summarized the operational experiences obtained with the Ahlstrom DXU-50-R type 2 m^3/sec cooling water pump. This type was developed specifically for the VVER-440 unit.

It was learned from this study that, in spite of the fact that the goal of the development work was known and the testing of the prototype was successfully completed, the pump became reliable only after several structural modifications were made. The anomalies observed in the course of the operation and the steps taken to prevent them were quite instructive.

SUBJECT FIELD 4

Of the 10 papers in subject field 4, 3 are the work of Hungarian, 3 of Finnish and 4 of Czechoslovak authors. Their common characteristic is that they provide practical knowledge about both startup and operational procedures. According to the work of A. Laukian, P. Skyttan, S. Merisaari and I. Tuominen, of the Finnish Company Imatran Voima Oy (IVO), entitled "Power Ascension and Startup Phases of a Nuclear Powerplant and Results Obtained," at the time of the start of the operation of L 2, the goals of IVO were as follows:

--to satisfy the official requirements in order to start operation as fast as possible;
--to obtain the zero level data of components and systems to be used during subsequent operation and maintenance;
--to acquire experimental and operational data to help with the preparation of final regulations for operation and breakdown prevention;
--to verify assumptions as far as possible;
--to perfect the operational processes and to acquaint the personnel with the plant;
--to make use of the experience gained during the operation of Loviisa, and 1;
--to employ the company's own personnel in all possible fields, to ensure that IVO has a cadre of well-trained experts to plan new nuclear power plants.

These goals have been successfully reached. The authors detailed the main periods of the commissioning operations from the purification and inspection of the components until the 14-day trial operation. They itemized the tasks to be completed during the various periods together with the pertinent timetable. The organization of the ascension to power was also briefly outlined.

Loviisa 2 could have been placed into operation more rapidly but the period was extended for several reasons, such as a fracture in the reactor container mantle, welding problems with the steam generator and main gate valve, and the TMI-2 accident, which necessitated additional tests. Probably as a result of the experience gained with Loviisa 1 and the excellent atmosphere of collaboration between the Finnish and the Soviet workers, individual phases of startup, especially the period of the power load increase, were greatly reduced.

According to the paper entitled "Experiences with the DXU-50-R-Type Main Circulating Pumps, Installed in the Loviisa 1 and 2, VVER-440-Type Nuclear Powerplant" by Engineer Jukka Timperi, a staff member of the Finnatom AB, several minor problems were encountered with the Loviisa 1 pumps. These construction and startup-related problems were due to the prototype nature of the pumps, which have not been eliminated during the 4,000-hour-long laboratory prototype testing.

During its half-year operation, Loviisa 2 did not stop functioning because of the cooling water pumps. The pumps could be easily maintained. During maintenance operation in 1979, six pumps were completely dismantled, checked and reassembled by four specialists in 3 weeks.

According to the paper entitled "Load Change Potential of the Nuclear Powerplant Steam Turbines" by Dr Botond Czinkoczky, adjunct professor, Chair of Thermal Machines of the Budapest Technological University, the steam temperature in units operated with a pressurized water reactor is significantly lower than in the conventional thermal plant units; in spite of this, heat stresses appeared in the turbines. In his paper, the author analyzed these problems, primarily on the basis of Soviet literature.

He stated that the load-change rate of the nuclear power plant is limited by the turbine. This is due to the following.
--The saturated or wet steam has a very high heat-transfer coefficient. The surface temperature of the housing wall follows practically without delay the temperature change of the steam. In view of this, significant temperature gradients are established within the wall of the turbine housing. When the load is reduced, the temperature of the steam is significantly lowered.
--Under the influence of thermal stresses, the planes of division open, leading as a result of the presence of wet steam to the evolution of silt erosion.
The author supplied a large volume of information, mostly on the basis of VTI calculations. He described the algorithms of turbine startup, which made it possible to start up and to load automatically the modernized K-220-44. This is used at the Loviisa Nuclear Powerplant in the Siemens-KWU variant.

According to the contract, it is not desirable to increase the performance of the turbine by removing the high-pressure preheaters, because the moisture content of the steam would rise to unacceptable levels. This is permitted in the case of the modernized K-220-44.

The same author submitted to the symposium a paper entitled "The Main Control-Instrumentation Characteristics of Nuclear Powerplant Steam Turbines," in which he discussed the requirements related to the control of the powerplant units from the viewpoint of their ability to accept fast load changes in the cooperating electrical power system. This inclusion of a nuclear powerplant unit into the frequency regulation of the network was studied by the Soviet VTI, at the Novovoronezh nuclear powerplant, where the transient functions of the unit were measured in the case of the sudden insertion of the control rods of the reactor (loss of load). When the control valves of the turbine are opened, the steam absorption and performance of the turbine in the secondary circuit increases rapidly, under the influence of the stored heat. In the case of the increased heat removal at the secondary side with the control valves open, the saturation parameters (temperature, pressure) in the steam generator are decreased and the steam absorption and performance of the turbine increases rapidly, resulting in the increase of the heat flow from the primary circuit.

The Soviet turbines allow two modes of operation: frequency regulation and combined frequency and live-steam regulation. There is an electrohydraulic control system with a maximum insensitivity coefficient of 0.06 percent. The average accuracy of the power level is 1.5 percent. Since the VVER-440 reactors contain two turbines, good, efficient, quantitative regulation may be achieved by loading them in succession.

The paper of engineers M. Kozak and P. Klima, staff members of the Czechoslovak Scientific Research Institute of Nuclear Power Engineering in Jaslovske Bohunice, described the operational experiences of units 1 and 2 of the Bohunice V-1 nuclear powerplant. When the paper was written, the authors were not able to compare the first campaigns of units 1 and 2 because unit 2 had not completed its own run.

Nevertheless, startup and operational results of unit 2 had been more favorable than those of unit 1. This is due not only to the experience gained with unit 1 but also to the activity of the enterprises participating in the installation work and operational startup.

At the very beginning of the power ascension operations, considerable attention was devoted to reliability and safety. The reasons for deviating from normal conditions were carefully analyzed in cooperation with the Soviet experts. From the start, the problem of economical operation also attracted their attention. They found that the continuous condenser-purification system was the most efficient step for improving the economic efficiency. Between 1978 and 1980, 297 solutions were adopted. The authors stated that the economic efficiency and operational safety of the VVER-440 unit may be further improved--among other steps, by improving the level of knowledge of the operating and technical staffs and by developing standardized maintenance specifications.

J. Bunta, a staff member of the Czechoslovak Scientific Research Institute for Nuclear Power Engineering, was the author of the paper entitled "Execution of Nonoperational Measurements and Their Utilization for the Study of the Power Regulators of the Reactor and the Turbine at the Time of the Ascension to Power of Units 1 and 2 of the Bohunice V-1 Nuclear Powerplant." According to his definition, the concept of nonoperational measurement refers to measurements, the sensors of which have been installed according to the design, but the signals had to be processed or recorded or the sampling frequency had to be increased.

The goals of the investigations were:
--checking the functions of the regulators;
--checking the effectiveness of the regulators;
--checking the joint operation of the regulators; and
--improved precision of the adjustment of the regulators.

Results included:
--determination of the low- and high-performance operating modes;
--transfer of the pressure sensor to the main steam collector;
--satisfactory joint operation of ARM and TVER at unit 2;
--other modernization activities; and
--startup of subsequent units requiring the most up-to-date instrumentation and computers.

The paper of Marian Krajchovic, a staff member of the Bohunice research institute, had as its subject the control of the operation of the reactor in case of the natural circulation of the heat-transfer agent. Natural circulation is obtained under the following conditions:
--last stage cooling after normal shutdown and
--shutdown of all main circulating pumps, emergency shutdown.
The author described the course of the tests, mentioning certain restrictions. The measured values and their recording were indicated in detail in tabular form. The results from units 1 and 2 were different; this was due to the following:
--differences in the input temperatures;
--differences in the system;
--geometric deviations in the primary circuit;
--inaccurate measurements.

The results of the tests are commensurate with those obtained in the Soviet Union, German Democratic Republic and Bulgaria. Cooling of the core by natural circulation was found to be acceptable.

In the paper authored by Milan Cvan, Jan Trukus and V. Polak, staff members of the Czechoslovak Scientific Research Institute for Nuclear Power Engineering, the thermal operational safety of the core in the first unit of V-1 during the first operational period was investigated. The authors studied the evolution of the heat-transfer crisis, using the results of operational parameters. They described briefly the applied method and indicated how the measurement results were processed. The results were presented in a tabular form for eight different states.

The results indicated clearly that during its first operating period, unit 1 of the V-1 nuclear powerplant did not reach the critical source and operated with a sufficient reserve. This amounted to a double safety.

According to the study by mechanical engineer Janos Tallosy, a staff member of the Paks Atomic Powerplant Enterprise, entitled "Preparations for Controlling the Operation of the Paks Atomic Powerplant," the VVER-440-type units of the Paks nuclear powerplant are being built with a new safety system that localizes the breakdown. Beyond this, the difference with the earlier similar unit consists in the operational control being assisted by a high-capacity informational computer system, Komplex Uran-2.

The Paks Atomic Powerplant Enterprise developed a task series for this informational computer system, recording expectations for the information system. This was needed because qualitatively the installed system makes a different operation management and control possible, while the development of the new computerized user software introduced into this system lagged behind. According to the task plan, the development of the basic data system for the information needed for operation was initiated. The daily operational information programs and the control algorithms prepared with the help of the heat-balance system are being developed. They may be used to assist the search for causes of eventual deviations and to make their effects apparent. By using the system on an informational computer, up-to-date information about the operation of the powerplant may be made available.

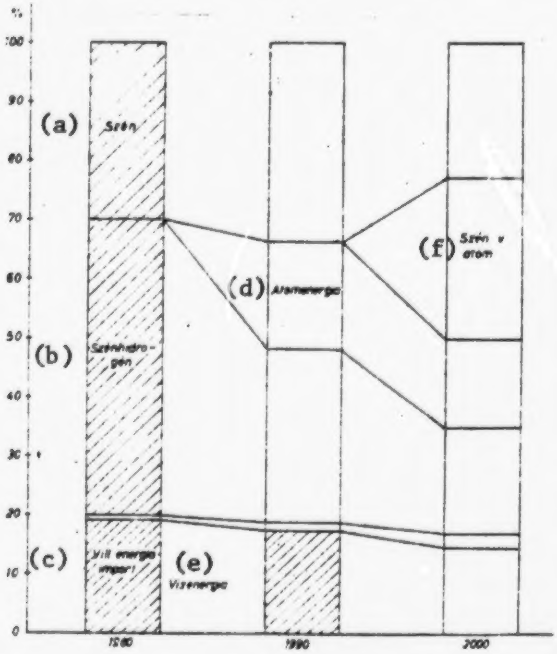


Figure 1. Structure of the consumption of the energy transfer agent of the electric power-generating industry (Hungarian Electrical Works Trust). (The designation "hydraulic power" follows that of the "imported electric power.)

KEY:
- a. Coal
- b. Hydrocarbons
- c. Imported electric power
- d. Nuclear power
- e. Hydraulic power
- f. Coal or nuclear

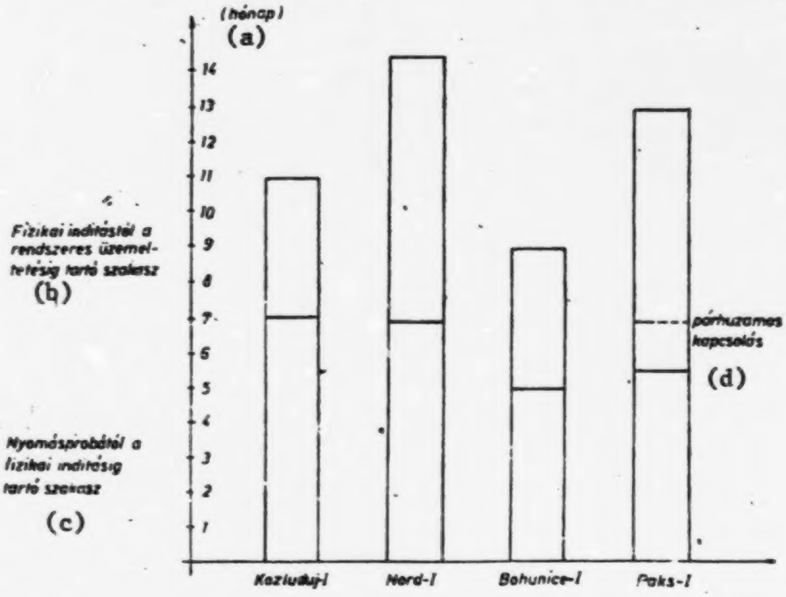


Figure 2. Commissioning periods of the nuclear powerplants operated with VVER-440 reactors

KEY:
- a. Month
- b. Period from physical startup (criticality tests) to normal operation
- c. Period from the pressure tests to physical startup
- d. Parallel connection

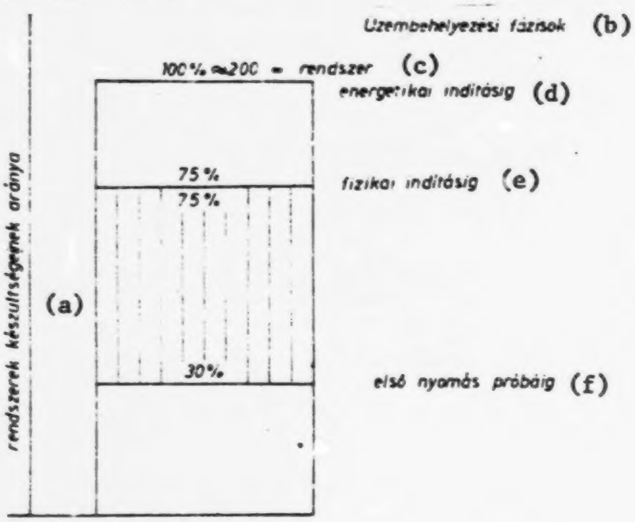

Üzembehelyezési fázisok (b)
100% ≈200 = rendszer (c)
energetikai inditásig (d)
75%
75%
fizikai inditásig (e)
rendszerek készültségének aránya
(a)
30%
első nyomás próbáig (f)

Figure 3. Requirement of startup, from the readings of the main system up to the most important phases of the commissioning procedure

KEY:
- a. Readiness ratio of the systems
- b. Commissioning phases
- c. System
- d. Until ascension to power
- e. Until physical start Up (criticality test)
- f. Until the first pressure test

Table 1. Some of the Characteristics of the Specifically Qualified Staff Members of the Paks Atomic Powerplant

Approved total strength for the 1,760-MW level	1,609	persons	(100%)
Received specialized training abroad	793	"	(49.59%)
Received specialized domestic training in nuclear power generation within the enterprise	750	"	(46.6%)
Received specialized domestic training in nuclear power generation outside the enterprise (universities, institutes)	360	"	(23.3%)
Period of specialized training per person			1.3 months

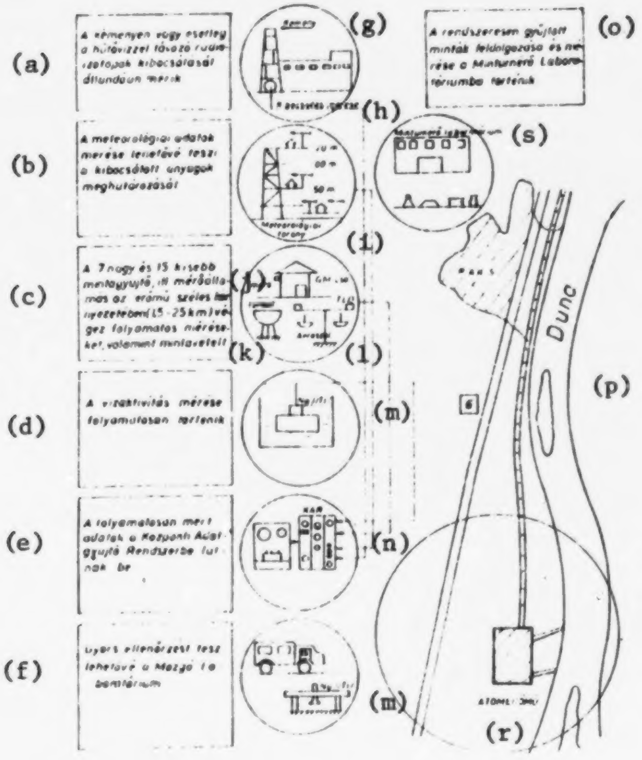

(a)
(b)
A meteorológiai adatok mérése lehetővé teszi a kibocsátott anyagok meghatározását
(c)
A 7 nagy és 15 kisebb
(d)
A vízaktivitás mérése folyamatosan történik
(e)
A folyamatosan mért adatok a Központi Adatgyűjtő Rendszerbe futnak be
(f)
(g)
(h)
(i)
(j)
(k)
(l)
(m)
(n)
(m)
(o)
A rendszeresen gyűjtött minták feldolgozása és mérése a Mintamérő Laboratóriumba történik
(p)
(r)
(s)
Duna

Figure 4. The environmental radiation safety control system of the Paks Atomic Powerplant

KEY: a. The radioactive isotopes released through the stack or with the coolant, are continuously checked.
b. The survey of the meteorological data makes it possible to determine the released materials.
c. The 7 large and 15 smaller sampling or survey stations carry out continuous measurements and sampling operations in the broad vicinity (15-25 km) of the powerplant.
d. The activity of the water is determined continuously.
e. The continuously determined data are collected in the Central Data Collection system.
f. The mobile laboratory makes rapid control possible.
g. Stack
h. Measurement of the release
i. Meteorological tower
j. GM counter
k. Fallout
l. Aerosol
m. NaI/Tl
n. Central Data Collection System
o. The systematically collected samples are processed and measured at the sample measuring laboratory.
p. Danube River
r. Nuclear powerplant
s. Sample measuring laboratory.

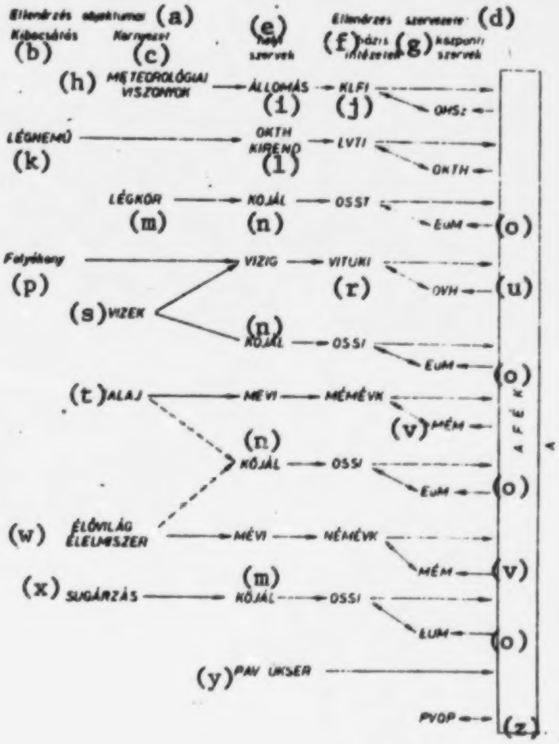
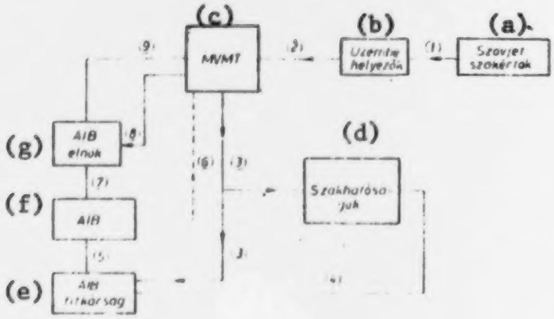

Ellenőrzés objektumai (a)
Kibocsátás (b)
Környezet (c)
(e) Helyi szervek
Ellenőrzés szervezete (d)
(f) bázis intézetek
(g) központi szervek
(h) METEOROLÓGIAI VISZONYOK
ÁLLOMÁS (i)
KLFI (j)
OMSZ
LÉGNEMŰ (k)
OKTH KIRENO (l)
LVTI
OKTH
LÉGKÖR (m)
KÖJÁL (n)
OSSI
EüM (o)
Folyóhany (p)
VIZIG
VITUKI (r)
OVH (u)
(s) VIZEK
(n) KÖJÁL
OSSI
EüM (o)
(t) ALAJ
MÉVI
MÉMÉVK
(v) MÉM
(n) KÖJÁL
OSSI
EüM (o)
(w) ÉLŐVILÁG ÉLELMISZER
MÉVI
NÉMÉVK
MÉM (v)
(x) SUGÁRZÁS
(m) KÖJÁL
OSSI
EUM (o)
(y) PAV UKSER
PVOP (z)
AFEK

Figure 5. Organization of the official environmental radiation-protection system and its relationship with the data processing and evaluating center

KEY:
a. Subjects of the control
b. Release
c. Environment
d. Organization of the control
e. Local organs
f. Basic institutes
g. Control organs
h. Meteorological conditions
i. Station
j. Control Institute of Atmospheric Physics
k. Gaseous
l. Branch of the National Bureau for the Protection of the Environment and Nature
m. Atmosphere
n. Public Health and Medical Clinic for Contagious Diseases
o. Ministry of Health
p. Liquid
r. Scientific Research Institute on Water Resources
s. Waters
t. Ground
u. National Water Bureau
v. Ministry of Agriculture and Food Industry
w. Biosphere, food
x. Radiation
y. Environmental radiation safety protection system of the Paks Atomic Powerplant
z. National Civil Defense Command



Processes:
1. 2. Reporting the completion of conditions
3. Document requesting the license; certification that the conditions have been fulfilled
4. Position of the specialized official agencies
5. Proposed license for the State Startup Committee
6. Eventual additional requirements
7. Decision of the State Startup Committee

8. Report of readiness before startup
9. Issuance of the license by the State Startup Committee

Figure 6. The startup licensing process (State Startup and Acceptance Control Committee--issuance of the license by the State Startup Committee)

KEY:
a. Soviet experts
b. Operation startup staff
c. Hungarian Electric Works Trust
d. Specialized official agencies
e. Secretariat of the State Startup Committee
f. State Startup Committee
g. Chairman of the State Startup Committee

CSO: 5100/3031
2210

PRINCIPLES OF QUALITY CONTROL AT THE NUCLEAR POWERPLANT BUILT IN HUNGARY

Budapest ENERGIA ES ATOMTECHNIKA in Hungarian No 12 1981 pp 539-543

[Article by Pal Nyerges and Zoltan Szonyi (degreed engineers, State Supervisory Agency for Power Generation and Safety Technology)]

[Text]

INTRODUCTION

The first and second extension units of the Paks Atomic Powerplant are being built on the basis of Soviet plans with Soviet assistance. Hungary participates significantly in the execution; therefore the installation is not built as a turnkey plant.

1. MAIN FEATURES OF THE PAKS ATOMIC POWERPLANT

The nuclear powerplant will have a Soviet-built VVER-440-type reactor and its main components, which met expectations in socialist countries. It is built on the basis of a Hungarian-Soviet interstate agreement.

The actual execution of the Paks Atomic Powerplant is somewhat different than previous construction. According to the Soviet safety principles for this type, should the maximum credible accident--i.e., breakage of the largest diameter primary piping (500 diameter)--occur, a tightly closed, shielded safety building that replaces the containment and resists internal overpressure, prevents the release of radioactive products into the environment. If pipe breakage is assumed, the escaping primary coolant will condense on the so-called localization tower, in contact with the inner space of the safety shield building, separated from the external environment or, more precisely, on its bubble plates.

The main components of the nuclear powerplant are supplied by the Soviet Union and individual socialist countries, while a large portion of the auxiliary system is prepared by domestic enterprises. Hungarian companies are also responsible for construction, assembly and commissioning activities. Certain special-purpose installations are supplied by capitalist firms.

The technical plan of the nuclear powerplant has been prepared on the basis of Hungarian-Soviet interstate contract concluded in 1966. A 1975 supplementary agreement serves as the basis of the construction of the most important part of the building.

The reactor vessel of the first unit, manufactured by the Czechoslovak Skoda Works, was installed in 1980. The technical-installation and functional testing of the individual system is on course. The startup of operations of the first unit is scheduled for the second half of 1981.

2. MOST IMPORTANT AGENCIES INVOLVED IN THE EXECUTION OF THE NUCLEAR POWERPLANT

In Hungary, the Ministry of Industry is in overall charge of powerplants, while the Hungarian Electric Works Trust supervises them directly. Within this agency's sphere of activity is the establishment of powerplants, responsibility for which has been assigned to its subsidiary, the Electric Powerplant Investment Enterprise.

The Enterprise for the Design of Electric Powerplants and Networks adapts to Hungarian conditions the plants developed by the Soviet design contractor, Teploelektroproyekt (TEP), and also carries out independent design activity, covering architectural and mechanical engineering installations contracted by Hungary. TEP carries out its general contractor responsibilities through the intermediary of Atomenergoexport (AEE), which handles Soviet exporting activities. Before technical erection started, the Hungarian Electric Works Trust established the Paks Atomic Powerplant Enterprise (PAPPE). The coordinated planning, execution, supply and assembly activities are carried out by 110 enterprises under the supervision of the Electric Powerplant Investment Enterprise. The relationship between the major agencies is illustrated in figure 1.

3. LEGAL AND TECHNICAL BASES OF QUALITY ASSURANCE

The safety regulations specified in the legal decrees of the atomic law (1) and of the responsible ministries and major agencies--defining the specific situation prevailing within the country--are applicable for the establishment of nuclear powerplants in Hungary. As far as establishment, these requirements agree well with the specifications in force in the Soviet Union and those prescribed by various international agencies (IAEA, ICRR, CEMA, ISO).

The atomic law assigned to the Ministry of Industry the technical regulations for the safety of nuclear powerplants. The jurisdiction for regulation by the Ministry of Industry includes the publication of technical safety requirements and specifications related to the establishment, startup, operation and decommissioning and the issuance of establishing, operating, modifying and decommissioning licenses and official inspections and tests.

According to the law concerning the state administrative Hungarian codes (2), this activity is carried out by the division of nuclear safety of the State

Supervisory Agency for Power Generation and Safety Technology (abbreviated as State Supervisory Agency) as the first-level safety engineering agency.

Following the decree of the Minister of Industry (3), the safety regulations and guidelines are prepared under the supervision of the State Supervisory Agency with the help of a broad range of studies by committees of technical experts, taking advantage of the most up-to-date literature, data and foreign experiences.

--The technical safety regulations of nuclear powerplants (4) contain the licensing procedure for the whole establishment and its main components, stating the fundamental design criteria, the basic licensing document prior to the establishment and operation, and the required content of safety reports.

--The quality assurance regulation of the establishment of nuclear powerplants (5) prescribes the fundamental quality assurance requirements for the planning, manufacturing, assembly, startup and operational periods.

In addition to these regulations, additional regulations and guidelines contain specifications concerning the most important areas of nuclear safety technology (pressure vessels, welding and control of welding) (5,6,7,8).

4. FUNDAMENTAL QUALITY ASSURANCE CHARACTERISTICS OF NUCLEAR POWERPLANTS IN HUNGARY

According to the basic principles of the quality assurance concerning the safety of nuclear powerplants:

--an overall program must be developed and executed, covering the whole establishment and all of its vital components; and

--a separate program must be developed and executed for each of the partial activities for the periods of design, fabrication, assembly, startup and operation.

These principles are generally applicable for all countries that establish a nuclear powerplant but they are executed differently, depending on the following factors:

--the level of the industrial development of the country in question;
--its industrial traditions and experiences;
--the level of the nuclear, legal and regulatory system; and
--the political and economic position of the country in question with respect to the supplier.

In the quality assurance practice of Hungarian nuclear powerplant construction, the following economic characteristics apply.

--Our country is an intermediately developed, small country; it cannot expect to become completely independent in the design and fabrication of nuclear powerplants.

--Hungary has considerable experience in the manufacture of certain conventional powerplant equipment and instrumentation, which resemble the technology of nuclear powerplant components, such as secondary-circuit systems, vessels, electrical devices, lifting and transporting machines.

--The country possesses an extensive system of basic and applied research and development institutes and an outstanding hinterland of education and training.

--Hungary established a practice of broad collaboration with both socialist and capitalist, developed and developing countries.

The organization, coordination and control of the quality assurance activity is divided between the Electric Powerplant Investment Enterprise and the State Supervisory Agency.

5. QUALITY ASSURANCE DURING THE PLANNING STAGE OF THE NUCLEAR POWERPLANT

The technical design of the Paks Atomic Powerplant and the safety report, developed at the same time, were adapted by the Enterprise for the Design of Electric Powerplants and Networks. Later, the Hungarian authorities checked and approved them. The specific, official Hungarian specifications, which contain the quality assurance requirements for that period, were effective while the overall design was prepared.

Even though the Soviet partner did not prepare an all-encompassing quality assurance plan for the inclusion in the general plan of the nuclear powerplant, both the nuclear steam-generating system and its Soviet-designed main components (reactor, steam generator) have been actually built in several countries (Soviet Union, German Democratic Republic, Bulgaria, Czechoslovakia, Finland) and are operating safely and reliably. Therefore the Hungarian side accepted the experience of the Soviet designers of the project as guarantee.

The quality of the plans are guaranteed by the dual general design. The Soviet plans are checked according to Soviet regulations by the internal control organs of TEP and the involved Soviet agencies and institutes. The adapted general design and the Hungarian schemes are checked for quality assurance by independent departments of the Enterprise for the Design of Electric Powerplants and Networks.

Control of the planning work is based on the mentioned regulations and guidelines and the supplementary specific design specifications approved by the State Supervisory Agency. The schematic diagram of the checkup of the design is illustrated in figure 2.

Assembly work on the premises is permitted only as indicated in work plans (welding, welding inspection), checked and approved by the State Supervisory Agency. Documentation of the various activities is a very important part of the quality assurance system. Identification and conciseness are based on a well-developed identification system that the designers, vendors, fabricators and assemblers have been using consistently since the start of the general design in every phase of the execution.

Installations and structural elements--both manufactured within the country and imported--that are subject to official licensing must have an operating manual, which must contain the most important technical features of the installation. The State Supervisory Agency issues an installation license only for devices or pipeline systems that satisfy the requirements of the safety report attached to the technical design and the manufacturing permits.

The operating manual of the nuclear pressure vessels serves also as a CEMA standard (10) and as a model for the piping manual for primary and secondary liquid systems. The latter includes the manuals and other technical documentation of all components within the system.

The installations are fabricated, assembled and started up as agreed in the Hungarian-Soviet supply-and-power startup contract. The Soviet-guaranteed conditions and the documentation requirements of the Hungarian authorities must be fulfilled. The documentation contains the certificates to be transmitted to the operator (Paks Atomic Powerplant Enterprise) and the materials in the registry, which remain in the possession of the contractors. The State Supervisory Agency, in cooperation with the pertinent technical committee responsible for the transfer and acceptance, carefully checks out the documentation.

6. QUALITY ASSURANCE DURING THE PHASE OF MANUFACTURING AND ASSEMBLY

Precisely because of the multilateral cooperation, it is difficult to achieve a uniformity in the quality assurance as far as the fabrication of nuclear powerplant components are concerned. When components to be imported are ordered, the Electrical Powerplant Investment Enterprise specifies in the contract the required quality assurance and documentation and prepares an acceptance, control and inspection plan for them. In the case of components manufactured in the Soviet Union, or supplied by the Soviet Union and fabricated in a third country, the Atomenergoexport specifies the Soviet state standards, which the Soviet authorities have established in their regulations.

As far as quality assurance, in the Hungarian-Soviet supply contract it has been agreed that an independent Soviet state supervisory agency, KPT, will check and supervise the testing and inspection at the fabricator's plant, as part of the customary inspection during and at the end of the manufacture. The State Supervisory Agency accepts KPI certifications in the documents and manuals accompanying the transported components, if they satisfy both the Soviet and the Hungarian safety requirements.

In some cases, the Electric Powerplant Investment Enterprise and the State Supervisory Agency participate in especially important quality tests during fabrication or at the final stage of certain components (for example, the pressure testing of the reactor vessels at the manufacturing plant). In the case of products supplied by the Soviets but imported from capitalist countries (for example, specialized armatures), the Soviet technical specifications must be fulfilled. Such products are tested and inspected, on the one hand, during or at the end of the fabrication and, on the other hand, at the time of the official safety test and functional checkup of the system. The State Supervisory Agency functions during the manufacturing and assembly period in the following manner.

--It checks the manufacturing and assembling documentation and carries out the structural inspections and pressure tests. If it finds everything adequate, it attaches an appendix to the manuals.

--It participates in the various functional tests of the primary and secondary circuit systems. Together with the technical committee responsible for the acceptance, without curtailing the warranty conditions assumed by the Soviet party, it certifies successful functional testing.

--It ascertains the suitability of fabrication and assembly by checking the qualification of the supplier, which at the same time facilitates or renders unnecessary offical inspection during fabrication or assembly.

Of these mentioned activities, qualification presents special interest (fig. 3). In order to issue a qualification certificate--which applies for a specific product and a specific time period--the enterprise in question must attach a certifying documentation to its application. The State Supervisory Agency creates a qualifying committee, including experts from the enterprises and specialized institutes, to study the contents in the application document. The qualifying committee, which also includes a representative of the State Supervisory Agency, evaluates the documentation, inspects the premises and then submits a proposal for qualification. On the basis of this proposal, the State Supervisory Agency makes a qualification decision. Having this qualification document in its possession, the domestic enterprise concludes a contract with the Electric Powerplant Investment Enterprise after a quality assurance plan concerning the product has been developed.

During the fabrication and assembling processes, which may include both officially controlled activities and those outside the scope of control cases requiring extraordinary decisions in order to assure the quality may be encountered. For this reason, the Quality Assurance Council (QAC) was created with the participation of the Paks Atomic Powerplant Enterprise, the Electric Power Investment Enterprise, the Enterprise for the Design of Electric Powerplants and Networks, and the State Supervisory Agency. This council is an important executive agency to ensure an acceptable quality.

Its tasks are:
--approval and inspection of fabrication and assembling techniques in areas not requiring official licensing;
--licensing of modifications;
--evaluation of techniques used by unqualified enterprises; and
--guidance and advice in special cases.

The role of the State Supervisory Agency in the field of activity of the Quality Assurance Council is primarily of an advisory nature. In areas requiring official licensing, the QAC has no right to issue a decision or a verdict.

7. QUALITY ASSURANCE DURING STARTUP

According to the Hungarian-Soviet startup contract, the nuclear powerplant will be started up by Hungarian technicians under the guidance of Soviet experts. The requirements indicated in the quality assurance plans must be gradually fulfilled during every stage of the startup operation; this is checked continuously by the authorities. The Atomenergoexport prepares the technical documentation for startup for the systems covered by the contract.

The technical startup documentation is verified by the Atomenergoexport, the Electric Powerplant Investment Enterprise, and the Paks Atomic Powerplant Enterprise. After that, it is transmitted to the State Supervisory Agency.

Under the following conditions the State Supervisory Agency issues a license to carry out the functional test for the individual technological systems, confirming that:
--the individual safety tests (structural inspection, pressure tests) of the pressurized system have been successfully completed;
--the State Supervisory Agency qualified all necessary documentation as acceptable and appended a suitable statement to the manuals;
--the partial functional tests of the individual technological systems, as indicated in the startup technical documentation and execution work program, have been successfully concluded; and
--the State Supervisory Agency participates in the functional testing of all systems and it certifies in the minutes their successful completion, in cooperation with the technical committee involved in the startup operation.

In Hungary, in addition to the safety authority, several agencies (for example, health, environmental protection, hydrological, internal affairs) participate in the licensing process of the startup operation of nuclear powerplants, proposing a variety of requirements within their own sphere of competence. They are coordinated by the National Atomic Energy Committee, which also controls the registry of the nuclear fuel material and represents the viewpoint of the International Atomic Energy Agency.

In the sense indicated in the atomic law, a State Startup Committee has been established under the participation of the involved ministries and major agencies. It issues power ascension licenses for the four main phases of the startup operations:

1. the first pressure test of the primary circuit;
2. physical startup (criticality tests);
3. the ascension power startup; and
4. continuous operation.

The regulations imply that the State Startup Committee will issue licenses for initiating these successive phases only if, in addition to the concurring approval of each involved official agency, all of the safety and qualification conditions have been fulfilled, as certified by the State Supervisory Agency.

After the successful completion of this multistage process, a license for continuous operation is issued. The qualifying documentation must include the following:

--certification of the completion of the inspections and activities specified in the quality assurance plans;

--evaluation of the results of the performed tasks and control operations to establish that complex safety conditions prevail; and

--zero-level measurement data and their evaluation.

Collection, classification and storage of the quality assurance documents approved by the authorities during the construction period is the duty of the Electric Powerplant Investment Enterprise and of the individual companies involved in the installation. These documents, organized according to the individual phases of the startup operation, are sent by the Electric powerplant Investment Enterprise for incorporation into the pertinent chapters of the safety report for the period prior to power operation to the Hungarian Electric Works trust for final checkup and approval. The latter transmits it to the operator (Paks Atomic Powerplant Enterprise) at the start of the continuous operation.

SUMMARY

The first nuclear powerplant under construction in Hungary incorporates the well-known VVER-440-type Soviet reactor and its main components. The nuclear powerplant is being built on the basis of a Hungarian-Soviet intergovernmental contract according to a Soviet design, with the help of Soviet experts. The main components are supplied by the Soviet Union. A large part of the auxiliary installations is fabricated by Hungarian plants; Hungarian enterprises are also carrying out the installation and startup operations. We have purchased many components from Western companies. Thus the supply represents a multilateral cooperation.

The quality assurance of the components and systems of the nuclear powerplant during the various phases of the construction was achieved in the following manner:

--Design. The design prepared by the Soviet general contractor (Teploenergoproekt) was adapted by the Enterprise for the Design of Electric Powerplants and Networks).

--Fabrication and assembly. The quality of components obtained from socialist countries during fabrication is controlled by the quality assurance agency of the supplying country, under the supervision of the Soviet control agency (KPI).

The quality of items from Western countries is guaranteed by the pertinent agency of the country in question, recognized by the National Energy

Management Authority. Similar strict quality assurance principles apply to domestically manufactured products. Fabrication of components or systems for nuclear powerplants or pertinent assembly operations are exclusively restricted to organizations qualified for such work. These qualifications are issued by the State Supervisory Agency. The assembly is managed and inspected by expert Soviet and Hungarian organizations. Both the specifications of the Hungarian-Soviet contract and the requirements of the Hungarian regulations must be satisfied in the course of manufacture and assembly.

--Startup and operation. The requirements contained in the quality assurance plans must be gradually fulfilled both until fuel-loading and during the phases controlled by the startup agencies. Approval for the main phases of startup is issued by the State Startup Committee. The documents of the realized quality assurance plans, which have been transmitted both to the officials and to the State Startup Committee, must be verified to ensure that they indeed satisfy the previously set conditions. These documents also represent a part of the final safety report.

1. ábra. A Paksi Atomerőmű létesítésének engedélyezésében érintett fontosabb intézmények

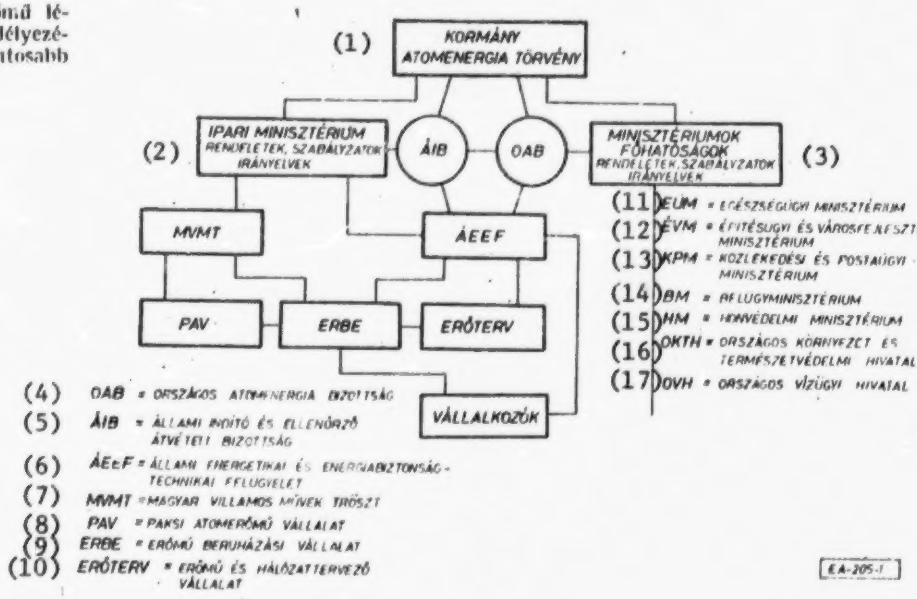
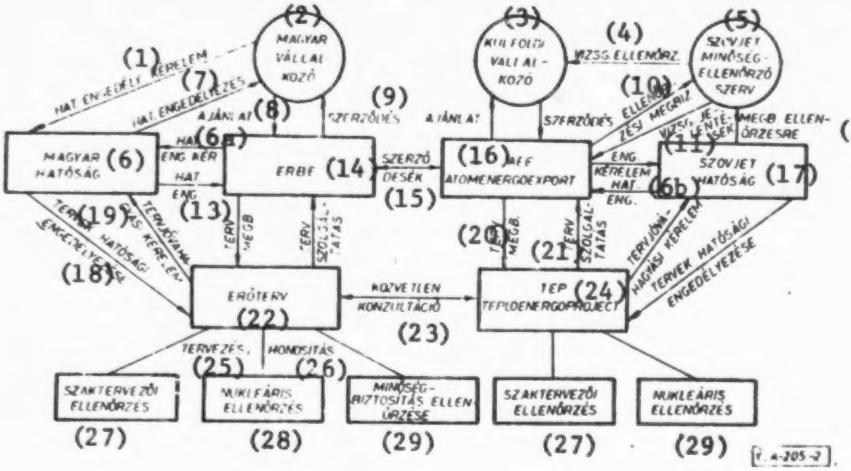

(1)
KORMÁNY
ATOMENERGIA TÖRVÉNY
(2)
IPARI MINISZTÉRIUM
RENDELETEK, SZABÁLYZATOK
IRÁNYELVEK
ÁIB
OAB
MINISZTÉRIUMOK
FŐHATÓSÁGOK
RENDELETEK, SZABÁLYZATOK
IRÁNYELVEK
(3)
MVMT
ÁEEF
PAV
ERBE
ERŐTERV
VÁLLALKOZÓK
(11) EÜM = EGÉSZSÉGÜGYI MINISZTÉRIUM
(12) ÉVM = ÉPÍTÉSÜGYI ÉS VÁROSFEJLESZTÉSI MINISZTÉRIUM
(13) KPM = KÖZLEKEDÉSI ÉS POSTAÜGYI MINISZTÉRIUM
(14) BM = BELÜGYMINISZTÉRIUM
(15) HM = HONVÉDELMI MINISZTÉRIUM
(16) OKTH = ORSZÁGOS KÖRNYEZET ÉS TERMÉSZETVÉDELMI HIVATAL
(17) OVH = ORSZÁGOS VÍZÜGYI HIVATAL
(4) OAB = ORSZÁGOS ATOMENERGIA BIZOTTSÁG
(5) ÁIB = ÁLLAMI INDÍTÓ ÉS ELLENŐRZŐ ÁTVÉTELI BIZOTTSÁG
(6) ÁEEF = ÁLLAMI ENERGETIKAI ÉS ENERGIABIZTONSÁG-TECHNIKAI FELÜGYELET
(7) MVMT = MAGYAR VILLAMOS MŰVEK TRÖSZT
(8) PAV = PAKSI ATOMERŐMŰ VÁLLALAT
(9) ERBE = ERŐMŰ BERUHÁZÁSI VÁLLALAT
(10) ERŐTERV = ERŐMŰ ÉS HÁLÓZATTERVEZŐ VÁLLALAT
EA-205-I

Figure 1. Some of the important organizations involved in licensing the establishment of the Paks Atomic Powerplant

KEY:
1. Government; Atomic Energy Law
2. Ministry of Industry; rules, regulations, guidelines
3. Ministries, major agencies; rules, regulations, guidelines
4. OAB--National Atomic Energy Committee
5. AIB--State Startup and Acceptance Control Committee
6. AEEF--State Supervisory Agency for Power Generation and Safety Technology
7. MVMT--Hungarian Electric Works Trust

8. PAV--Paks Atomic Powerplant
9. ERBE--Electric Powerplant Investment Enterprise
10. EROTERV--Enterprise for the Design of Electric Powerplants and Networks
11. EUM--Ministry of Health
12. EVM--Ministry of Construction and Urban Development
13. KPM--Ministry of Transportation and Postal Affairs
14. BM--Ministry of the Interior
15. HM--Ministry of Defense
16. OKTH--National Bureau for the Protection of the Environment and Nature
17. OVH--National Bureau of Water Conservation

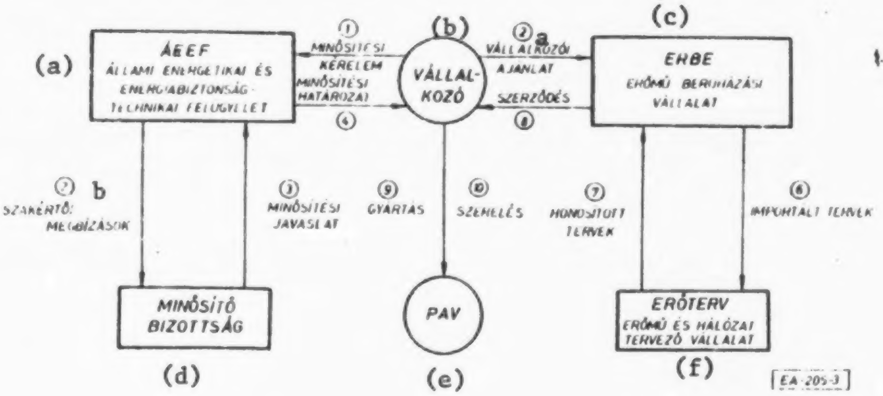

(1)
HAT. ENGEDÉLY KÉRELEM
(2)
MAGYAR VÁLLALKOZÓ
(3)
KÜLFÖLDI VÁLLALKOZÓ
(4)
VIZSG. ELLENŐRZ.
(5)
SZOVJET MINŐSÉG-ELLENŐRZŐ SZERV
(7)
HAT. ENGEDÉLYEZÉS
(8)
AJÁNLAT
(9)
SZERZŐDÉS
AJÁNLAT
SZERZŐDÉS
(10)
ELLENŐRZÉSI MEGBÍZ.
(11)
VIZSG. JELENTÉSEK
MEGB. ELLENŐRZÉSRE
(12)
MAGYAR HATÓSÁG (6)
HAT. ENG. KÉR.
(6a)
HAT. ENG.
(13)
ERBE (14)
SZERZŐDÉSEK
(15)
(16) AEE ATOMENERGOEXPORT
ENG. KÉRELEM
HAT. ENG.
(6b)
SZOVJET HATÓSÁG (17)
(19)
TERVEZÉS HATÓSÁGI ENGEDÉLYEZÉSE
(18)
TERVJÓVÁHAGYÁS KÉRELEM
TERV MEGB.
TERV SZOLGÁLTATÁS
(20)
TERV MEGB.
(21)
TERV SZOLGÁLTATÁS
TERVJÓVÁHAGYÁSI KÉRELEM
TERVEK HATÓSÁGI ENGEDÉLYEZÉSE
ERŐTERV
(22)
KÖZVETLEN KONZULTÁCIÓ
(23)
TEP TEPLOENERGOPROJECT (24)
TERVEZÉS, HONOSÍTÁS
(25)
(26)
SZAKTERVEZŐI ELLENŐRZÉS
(27)
NUKLEÁRIS ELLENŐRZÉS
(28)
MINŐSÉG-BIZTOSÍTÁS ELLENŐRZÉSE
(29)
SZAKTERVEZŐI ELLENŐRZÉS
(27)
NUKLEÁRIS ELLENŐRZÉS
(29)
V. 4-205-2

2. ábra. A Paksi Atomerőmű tervezésének ellenőrzési sémája

Figure 2. Schematic diagram showing the control steps in the design of the Paks Atomic Powerplant

KEY:
1. Application for official permit
2. Hungarian contractor
3. Foreign contractor
4. Control inspection
5. Soviet quality control agency
6. Hungarian agency
6a. Official request for license
6b. Request for license
7. Official license
8. Proposal
9. Contract
10. Control assignment
11. Inspection reports
12. Control authority
13. Official permit

14. Electric Powerplant Investment Enterprise
15. Contracts
16. State Power Generation (Atomenergoexport)
17. Soviet agency
18. Official approval of the design
19. Request for the approval of the design
20. Commissioning of design
21. Furnishing of design
22. Enterprise for the Design of Electric Powerplants and Networks
23. Direct consultation
24. Teploenergoproyect (TEP)
25. Design
26. Adaptation
27. Control by expert designers
28. Nuclear control
29. Quality assurance control


(a)
ÁEEF
ÁLLAMI ENERGETIKAI ÉS ENERGIABIZTONSÁG-TECHNIKAI FELÜGYELET
①
MINŐSÍTÉSI KÉRELEM
MINŐSÍTÉSI HATÁROZAT
④
(b)
VÁLLAL-KOZÓ
②a
VÁLLALKOZÓI AJÁNLAT
SZERZŐDÉS
⑧
(c)
EHBE
ERŐMŰ BERUHÁZÁSI VÁLLALAT
② b
SZAKÉRTŐI MEGBÍZÁSOK
③
MINŐSÍTÉSI JAVASLAT
⑨
GYÁRTÁS
⑩
SZERELÉS
⑦
HONOSÍTOTT TERVEK
⑥
IMPORTÁLT TERVEK
MINŐSÍTŐ BIZOTTSÁG
(d)
PAV
(e)
ERŐTERV
ERŐMŰ ÉS HÁLÓZAT TERVEZŐ VÁLLALAT
(f)
EA-205-3

3. ábra. A gyártó és szerelő vállalatok minősítésének sémája

Figure 3. Schematic diagram for the qualification of fabricating and installing enterprises

KEY: a. State Supervisory Agency for Power Generation and Safety Technology
b. Contractor
c. Electric Powerplant Investment Enterprise
d. Qualifying Committee
e. Paks Atomic Powerplant
f. Enterprise for the Design of Electric Powerplants and Networks

1. Request for qualification
2a. Proposal by the contractor
3. Qualification proposal
4. Qualification decision
6. Imported designs
7. Adapted designs
8. Contract
9. Fabrication
10. Assembly
2b. Expert assignments

2210
CSO: 5100/3031

CNEA CHAIRMAN ON NUCLEAR SELF-SUFFICIENCY

PY020040 Buenos Aires TELAM in Spanish 2245 GMT 30 Aug 82

[Text] Mendoza, 30 Aug (TELAM)--Vice Adm Carlos Castro Madero, chairman of the National Atomic Energy Commission [CNEA], has stated that Argentina will be self-sufficinet in nuclear matters by the year 2000.

He said that the country will be able to build its own nuclear plants, to supply them and also to be in a position of cooperating with Latin American countries in this field.

Regarding research and mutual aid in the nuclear energy sector which Argentina is carrying out, he stated that Argentina maintains close contact with all Latin American countries. It is obvious, he stated, that the most important cooperation is being carried out with Peru, with which Argentina is building a nuclear center which is in an advanced state of construction, and which is expected to be finished by the end of next year.

Castro Madero arrived in this capital this afternoon by air and was welcomed at Plumerillo Airport by Social Welfare Minister Horacio Arnut, officials of the local CNEA delegation and of the Mendoza nuclear delegation, and other officials.

At the airport VIP lounge the CNEA chairman referred to relations and the work of the Argentine nuclear organization with other countries. He stated that the Embalse Nuclear Plant is being built jointly with Canada, and that fortunately, despite the conflict over the Malvinas, there has been no interference. He expressed confidence that this plant will be put into operation by the end of this year or the beginning of next.

Castro Madero admitted that the CNEA's current budget situation is very difficult due to the situation which is known to everyone. He added, however, that this will not force Argentina to give up its plan on nuclear energy matters, because we will be able to reach a balance concerning reducing the rate of progress of the nuclear plan, without affecting appreciably the Argentine position or its progress in this regard.

Regarding the so-called nuclear waste, Castro Madero stated that the country must plan ahead about what to do with the final products of the nuclear fuel cycle since it has already made the decision to reprocess them so as to increase its uranium resources.

He stated in this regard that the product of the processing plant is what worries the whole world, but we have not arrived at the situation which at this moment worries the most developed countries. That is to say, to have storage facilities ready.

In this regard he explained that a series of studies has been initiated with the cooperation of San Juan University and that 200 suitable places have been spotted. He added that they chose a place located in Sierra Del Medio, Chubut Province, where studies are being carried out to find out whether facilities can be installed there.

Asked about the military use of nuclear energy, Castro Madero reiterated that Argentina's unchanged position has been to use nuclear energy with exclusive purposes [as received].

He explained that the controversial point is whether or not the use of nuclear energy in a submarine is a peaceful use. This issue has been clearly proposed to the CNEA [as received]; it has been requested that the topic be included in the agenda of the meeting to be held in Vienna in September 1982.

Finally, concerning the Sierra Pintada deposits in San Fafael department in southern Mendoza, he said that it has been advised that the call for bids for the exploitation of the deposit be delayed until the end of the year.

Castro Madero then presided over the celebration of the fifth anniversary of the Mendoza nuclear project. He is due to return to Buenos Aires tomorrow night after a visit to southern Mendoza.

CSO: 5100/2250

EMFA CHIEF SAYS BOMB IMPORTANT IF PROBABLE ENEMY HAS IT

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 7 Aug 82 p 6

[Text] Rio--Chief of the Armed Forces General Staff [EMFA) Gen Alacyr Frederico Werner said in Rio yesterday that despite the need to reequip the armed forces, the distribution of budget funds to the sectors that make development possible will continue to be the priority. "Since there is no foreseeable threat in the short term," said the general, "I believe that we can continue to run that calculated risk."

Alacyr Frederico Werner, who explained the general guidelines of the Armed Forces Genreal Staff policy to the students of the War College (ESG), said that Brazil maintains unchanged its "peaceful position" of not producing an atomic bomb. "The Brazilian Armed Forces," he explained, "consider it very important to have an atomic bomb if a possible or probable enemy has it. But until that occurs, we will pursue our peaceful option on the use of nuclear energy."

Werner related that in his talk, he sought to show the need for integration among the land, sea and air forces, "based on the lessons of modern wars, particularly since World War II. There is no longer any armed conflict that can be won with a single, isolated force. It has to work together with the others in the battlefield. More than that, that preparation must be made beginning in peace time. That perhaps is the principal mission of the EMFA, which is to stimulate the mutual cooperation, work, training and drilling of the armed forces."

In the opinion of General Werner, the Falklnads war is a good example of the need for integration among the three forces, and the impossibility of Argentina to achieve that objective ended up leading it rapidly to a critical situation in the defense of the islands. "That stemmed obviously from the distance of the Malvinas from Argentine continental territory. The ground and air forces were in the islands but the naval forces were unable to participate because of the technological superiority of the adversary. The air force also had very few opportunities to support the ground force because the range of the planes prevented that aid," he declared.

Development and Security

The minister-chief of the EMFA admitted that there is a great desire to reequip the Brazilian Armed Forces. "But the problem is that we would be reducing the investments in development, that is, in sectors that would make it possible to raise or, at least, to maintain the national living standard. Since there is not a foreseeable threat in the short term, I believe we can continue to run this calculated risk. So we will be buying only 2 submarines instead of 100."

Alacyr Frederico Werner admitted that the situation of Brazil is cause for concern "and it would be foolish to say that the serious situation the world is going through does not affect Brazil is such a way as to concern us.

"Today, I had the occasion to tell the students of the ESG that last year Brazil spent $10 billion buying oil. If the oil prices were the same as they were at the beginning of 1973, Brazil could satisfy its oil needs for less than $1 billion. Then we would have the possibility of having $9 billion available today. That would be enough to pay off Brazil's current foreign debt in 5 years, or would be enough to purchase 36 frigates, or more than 100 submarines. Unfortunately, we will have to content ourselves with only two more submarines now," he declared.

Atomic Bomb

The chief of the EMFA stressed that, in accordance with its peaceful policy, Brazil opted for the use of nuclear energy for nonmilitary purposes. "Therefore, there is no project at the government level for the use of nuclear energy for military purposes. The only military purpose for which we can and should use nuclear energy will be, unquestionably, the propulsion of our ships, particularly our warships. Naturally, that is not for the near future. We will only attain that technology further down the line."

8711
CSO: 5100/2238

CALS REFUTES CNEN REPORT ON FURTHER ANGRA-I DELAY

Sao Paulo FOLHA DE SAO PAULO in Portuguese 6 Aug 82 p 17

[Text] Santa Barbara--Mines and Energy Cesar Cals announced yesterday that Westinghouse technicians will be in Brazil by the end of September to change the steam-cooling system equipment of the Angra-I nuclear plant, asserting also that the plant will begin to operate at full capacity at the beginning of 1983. The National Nuclear Energy Commission (CNEN) had announced 3 days ago that Angra-I would be further delayed in view of the problems that had emerged and that full load operation would not be possible at the beginning of next year.

The changes to be made by the Westinghouse technicians are necessary to avoid the further leakage of steam as occurred in the plants produced by the same company in Sweden, Spain and even in Angra-I, which even caused cracks in some piping.

According to Cesar Cals, Westinghouse desinged and tested the new equipment on a reduced scale. "Now it will begin to test it on a one-to-one scale and it will make the change here in Brazil only with safety," the minister said, but he could not say if the Brazilian plant will be the last to be repaired after the changes in the units in Sweden and Spain.

Cals asserted also that Brazil is not thinking of suing the American company for the losses caused by the problems in the steam generator. "What we want is for the plant to go into operation. What might be fitting would be to ask for indemnification for lost revenue but that is not the case since we do not need to use the energy from Angra," he said.

In the opinion of the mines and energy minister, the fact that Angra-I has not gone into full-capacity operation is not causing losses to Furnas because the company does not need the energy. He explained that Brazil "does not have a pressing need for electric energy based on nuclear power inasmuch as consumption in the Southeast market is low."

8711
CSO: 5100/2238

NUCLEBRAS DENIES RESENDE TO BE SITE OF REPROCESSING PLANT

Rio De Janeiro O GLOBO in Portuguese 30 Jul 82 p 11

[Text] O GLOBO has received the following letter from the president of the Brazilian Nuclear Corporation (NUCLEBRAS), Ambassador Paulo Nogueira:

"In a report published in the edition of the day before yesterday, 27 July, under the title: "Committee Wants To Ban Nuclear Plants in the Paraiba Valley," O GLOBO reports that the Executive Committee for Integrated Studies of the Hydrographic Basin of the Southern Paraiba River (CEEIVAP) is studying the establishment of restrictions on the installation of nuclear plants and nuclear fuel reprocessing plants in that hydrographic basin to preserve the quality of the water.

"The same report adds, as information from the newspaper, that 3 years ago NUCLEBRAS began the construction of a plant for reprocessing the uranium of the Angra dos Reis plant, on the bank of the Funil Dam in Itatiaia in the municipality of Resende. It says also that the dangers which this project represents to the principal source of drinking water of Greater Rio will be discussed during the Declaration of the Rights of the Paraiba River seminar sponsored by O GLOBO and the Light Company, on 3 and 4 August, in the auditorium of the Federal Savings Bank.

"In view of the fact that this is a seminar sponsored by O GLOBO, I believe it is especially opportune to convey to my esteemed friend some corrections to the aforementioned report. At no time did NUCLEBRAS consider building a nuclear fuel reprocessing plant in Resende. There is no company document or statement of any kind by anyone in tis management that could lead O GLOBO to publish what it did. More absurd still is the statement that that plant has been under construction 'for 3 years.'

"What NUCLEBRAS is building in the Engineer Passos District--and not in the Itatiaia District, as O GLOBO reported--in Resende is an industrial complex to be comprised of a plant for the conversion of uranium dioxide into uranium hexafluoride, a uranium istopic enrichment plant and a fuel element factory, to be inaugurated within 2 months. None of them will reprocess irradiated fuel, that is, fuel already spent in a nuclear power station.

"The three NUCLEBRAS industrial units in Resende, by thier nature, will not release radioactive wastes and cannot contribute anything to cause any harm to the environment, much less the waters of the Paraiba River.

"The Fuel Element Factory (FEC) which will go into operation soon is a mechanical assembly industry which has no way of polluting the environment. Nevertheless, because it is a nuclear industry, in which the measures aimed at preserving the environment are much stricter than in any other industrial branch, it has an internal safety program for nuclear accounting, and an external one of environmental monitoring. The latter, supervised by the National Nuclear Energy Commission (CNEN) and the State Secretariat of the Environment (SEMA) makes a periodic evalution of environmental conditions and of its effects on the air, water, soil, plants, agricultural products and animal products, and places the data gathered at the disposal of both those organs as well as the general public.

"If the other industries were to adopt the same standards of preservation of the environment, the problem of pollution would not be causing so much concern today in the world.

"To have an idea of the safety of the three plants of the NUCLEBRAS industrial complex in Resende, suffice it to note these data: international regulations indicate that the acceptable limit of uranium in drinking water is 042 mg/liter. If, only for the sake of argument, we assumed the absurd possibility of NUCLEBRAS not utilizing the production of its three factories at all but, on the contrary, poured it all into the Paraiba River at one time, even so the water of the river would still be within that limit which international regulations indicate as acceptable.

"Furthermore, the safety standards of the Resende industrial complex were recognized by O GLOBO in reports on the FEC published in its editions of 31 January and 14 March of this year. In gathering data for the two reports, the newspapers reporters had full freedom of observation and no information was concealed from them. The first of these reports, moreover, emphasized the factory's environmental monitoring program, begun well before the date envisaged for its opening.

"Nevertheless, if there remains any doubt regarding the care taken at the site with reference to ecological preservation, NUCLEBRAS is ready once again to receive the reporters of O GLOBO, to show them all the installations of the industrial complex and to give them any information they desire.

"I also wish to point out the contradiction between the information in the title of the report, that the committee wants to ban nuclear plants, and that of the opening paragraph, that the aforementioned committee is studying the establishment of restrictions on the installations of nuclear plants and reprocessing plants. Even at that, the report is invalid. The proposal to which the report refers was not accepted by the committee."

8711
CSO: 5100/2258

CNEN LICENSES FUEL ELEMENT PLANT IN RESENDE

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 7 Aug 82 p 25

[Text] Rio--The National Nuclear Energy Commission (CNEN) yesterday approved the license for operation of the fuel element factory of the Resende nuclear complex, which will assemble the charges of Brazilian nuclear reactors up to the year 1988, when the enrichment plant should be ready, thus enabling Brazil to be self-sufficient in the nuclear supply area.

The Resende nuclear complex is comprised of the fuel element factory, the plant for the conversion of yellow-cake into uranium hexafluoride and the uranium enrichment industrial plant. The two remaining units, the conversion plant and the enrichment plant, are behind schedule as a result of the hitches faced by the jet-nozzle technological process, which was the only option for uranium enrichment under the German-Brazilian nuclear agreement.

The uranium conversion plant was purchased by NUCLEBRAS from Pechiney Ugine Khulman under the turn-key system, that is, without the transfer of technology. At the time, Brazilian scientists protested, saying that the purchase was unnecessary since the Nuclear Research Institute of Sao Paulo had successfully developed that technology. NUCLEBRAS replied that the purchase was essential to supply the fuel element factory with raw material.

Now the fuel element factory is ready to operate although the hexafluoride conversion plant is delayed, forcing NUCLEBRAS to pay France for the yellow-cake conversion service. Practically, what is ready and will begin to operate is only the terminal part of the Resende nuclear complex. The two first units that are going to produce the raw material for the third are going to be delayed in entering into operation.

In any case, NUCLEBRAS considers the inauguration of the fuel element factory very important because it will eliminate one of the phases of the burdensome process of producing nuclear fuel. The fuel element factory is of the mechanical, semiheavy, high-precision type, in which almost all phases are controlled by computers to avoid manual contact or any impurities. The very cold air conditioning maintains an internal density in the factory that isolates it from dust.

To produce the fuel element, the factory will use the uranium hexafluoride, transforming it into uranium dioxide. Then it pelletizes that uranium dioxide in the form of little rods 1 centimeter in diameter by 3 meters long in casings of "zircalloy," a metallic alloy that will be supplied by Argentina. Before being hermetically sealed, that rod receives an inert atmosphere of helim gas. About 235 little rods comprise a fuel element, which is taken into the nucleus of the reactor for the fission process.

8711
CSO: 5100/2238

BRIEFS

ANTIBOMB PROTEST IN PARANA--Curitiba--In Parana yesterday, about 50 persons participated in a march against the use of nuclear weapons promoted by the Sete Quedas Movement which 2 weeks ago organized a large demonstration in Guaira against the flooding of the Sete Quedas falls by the Itaipu Hydroelectric Plant reservoir. The march went through the main streets of the city, with the demonstrators covered by white shrouds and bands and carrying placards that warned: "Better active today than radioactive tomorrow." The leaflet distributed during the demonstration recalls the U.S. atomic bombing of Hiroshima and Nagasaki which killed more than 200,000 persons. The leaflet warns about the large arsenal maintained today by the world powers, which have weaponry sufficient to launch 15 tons of atomic dynamite [as published] to kill every inhabitant on the planet." According to the movement, Brazil is preparing to join the "atomic club" with the construction of nine nuclear plants. The document says that "4 million low-cost homes could be built with the funds used in the construction of only one plant. The march, which ended without any speeches, left only one message: "If you do not agree, discuss, make your complaints known." [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 8 Aug 82 p 31] 8711

DELAYS IN ANGRA-I, III--Rio--Mines and Energy Minister Cesar Cals announced in Rio yesterday that the nuclear program will be delayed by the slowing down of its projects in conformity with available funds. He added that the Tucurui project (generation part) will be delayed for 1 year and that of Itaipu (transmission lines) for 6 months. The decision taken by the government was to extend the schedules for the projects in accordance with existing revenue and based on the decision that each project will only be begun or speeded up with the money guaranteed. Cesar Cals said that the possibility was opened for obtaining new funds through loans in the domestic and foreign markets by authorization of the Planning Secretariat (SEPLAN), already granted. According to the minister, with the extension of the projects in Sao Paulo will be delayed. With regard to Tucurui, he observed that the 1-year delay will exclude the guarantee of supplying energy to the Carajas project companies because the transmission line has been completed. Referring to Itaipu, he indicated that its projects may continue normally if new funds are obtained. [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 10 Aug 82 p 33] 8711

CSO: 5100/2238

BRIEFS

NUCLEAR ACCIDENT REPORTS DIFFER--Duesseldorf/Karlsruhe, 27 Aug (DPA)--Conflicting accounts were given today about a mishap which occurred on 20 August at the Wuergassen nuclear power station. The North Rhine-Westphalian Labor Ministry confirmed that radioactive dust was released when a sand filter was exchanged. But the exposure of workers and the room concerned was well within the permitted radiation level. "No one suffered injury," a ministry spokesman said. However, according to the Federation of Environmental Action Groups, two workers were taken to the hospital. The staff had been asked to keep the incident secret. The 600 MW nuclear power station has been switched off since May for maintenance work. It was commissioned in 1972. [Excerpts] [LD272018 Hamburg DPA in German 1716 GMT 27 Aug 82]

CSO: 5100/2246

BRIEFS

BOMB EXPLODES AT TOULOUSE--Toulouse, Aug 19 (AFP)--A bomb exploded during the night outside the offices of a construction firm here working on the site of the Golfech nuclear power plant, causing no casualties but considerable damage. The main building caught fire, and a temporary prefabricated office unit nearby was totally destroyed. It was the second bomb attack [word indistinct] last night, within 24 hours of President Francois Mitterrand announcing new anti-terrorist measures. [Text] [NC191039 Paris AFP in English 1032 GMT 19 Aug 82]

CSO: 5100/2244

END

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20 October 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 167

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WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 167

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PRESS REPORT ON TARAPUR FUEL TALKS WITH FRANCE

Talks Open in New Delhi

Calcutta THE STATESMAN in English 7 Sep 82 p 1

[Text]

NEW DELHI, Sept. 6.—Talks began here today between a visiting French delegation headed by a senior member of the French Foreign Ministry, Mr Jacques Andreani, and an Indian delegation headed by the chairman of the Atomic Energy Commission, Dr Homi N. Sethna, on the supply of fuel for the Tarapur atomic power station.

An External Affairs Ministry spokesman said the talks were being held in an atmosphere of great cordiality and understanding.

Mr Andreani, who is the Secretary for Political Affairs in the French Foreign Ministry, is the third-ranking member in that Ministry, after the Foreign Minister and the Foreign Secretary.

The other two members of the French delegation are: Mr Louis Amigues, who deals with nuclear issues in the Foreign Ministry, and Mr Petit, a senior functionary of Cogema, a subsidiary of the French Atomic Energy Commission handling the export of nuclear material and equipment.

It was not clear who else were in the Indian delegation, besides Dr Sethna, at today's talks.

Although the official spokesman gave little information other than that the talks had begun, it is presumed that the talks were on settling the differences that had arisen over the French terms of supply of low-enriched uranium. The differences are said to relate to three elements in the draft agreement that France had sent India: the pursuit clause, the perpetuity clause and the proposal for a trilateral agreement between India, France and the International Atomic Energy Agency on safeguards.

Apparently, the scope of the pursuit and perpetuity clauses in that draft is larger than in the original Indo-U.S. agreement of 1963. Since, under the accord reached with the USA, the French sale of low-enriched uranium for Tarapur was to be within the framework of the 1963 agreement, India is naturally not agreeable to anything not in that original agreement. Also, since India already has a trilateral agreement on IAEA safeguards for Tarapur, it does not think a fresh agreement is indicated for supply of French fuel.

The French view seems to be that the terms of its eight-point draft agreement were nothing new, that they were indeed routine in all such deeds, and that in any case, the differences over them could be discussed and settled, as proved by the arrival of the delegation headed by Mr Andreani. South Block also evidently feels the same way

One view heard today was that under the Indo-U.S. accord over the Tarapur fuel, announced during the Prime Minister's visit to the USA, that country was to arrange for its replacement by France as supplier of fuel for the power station within the framework of the 1963 agreement, that the USA was bound to carry out that accord, and that the current controversy over French terms of supply was needless and apparently engineered by elements unhappy over Mrs Gandhi's successful U.S. visit.

First Day of Talks

Madras THE HINDU in English 8 Sep 82 p 1

[Article by G. K. Reddy]

[Text] NEW DELHI, Sept. 7.

Indian and French officials made an earnest effort today to try and find some way out of the present impasse over the question of nuclear safeguards, but they virtually drew a blank after talking quite candidly for several hours about each other's limitations in making any major concessions to pave the way for a settlement.

The French continued to talk of their keen desire for a settlement, but only on their terms that were totally unacceptable to the Indian side, which hinted at one stage that the new fuel supply arrangement would have to be scrapped in the absence of an understanding on the safeguards question.

Indian officials did some plain speaking at a dinner tonight given in honour of the French delegation, leaving the French Government in no doubt whatsoever about India's determination not to yeild on the applicability of the pursuit and perpetuity clauses. It was left to the French delegation to indicate, preferably before its departure tomorrow, whether France would abide by the earlier understanding that only the existing level of safeguards would be applied without any extra conditions.

No explanation: There was no satisfactory explanation at these talks from the French side why France had agreet in the first place to take over the fuel supply responsibilities from the U.S. as an on-going arrangement under the 1963 agreement, without making abundantly clear that it would insist on additional safeguards to bring them on par with current International Atomic Energy Agency requirements. But the French could not be accused of going back on the earlier understanding until the U.S. came forward and explained what exactly had been agreed upon between them, before India was told that France was ready to assume the role of a substitute supplier under the 1963 agreement.

But the French continued to make a big fetish of their flexibility in conceding in advance India's right to reprocess the spent fuel supplied by it without any joint determination, as subject only to IAEA clearance about the safeguardability of the plant. They also reminded India that France would not insist on any exclusive right to supply fuel for Tarapur during the remaining 10 years of the 30-year agreement.

In other words, it would be open to India to terminate the purchase of enriched uranium from France after giving due notice, if the country's nuclear scientists were ready to run the plant on substitute fuel during the remaining period of this agreement. But the perpetuity clause would continue to be applied to the French fuel even after termination of the supply agreement.

The leader of the French delegation, Mr. Jacques Andreani, wanted to have an exchange of views tomorrow with officials of the External Affairs Ministry on current international developments and some of the issues likely to come up during the UN General Assembly session. But it was indicated by the Indian side that the safeguards question should be thrashed out one way or the other before his departure.

The Chairman of the Atomic Energy Commission, Mr. H. N. Sethna, who was scheduled to return to Bombay this evening was asked to stay on in Delhi. The former Secretary in the External Affairs Ministry, Mr. M. A. Vellodi, who had dealt with the safeguards question in the past, is arriving tomorrow from Madras for consultations.

Blessing?: The disengagement from this ill-fated French involvement, in the absence of a reasonable settlement of the safeguards issue, might prove in retrospect to be a blessing in disguise, if the Government of India would utilise this as a legitimate reason for getting off the hook by abrogating the 1963 agreement. But it would require political courage to do so in the face of American threats to apply economic pressures if there was no agreed termination.

It would be known only tomorrow, after the conclusion of the final round of discussions, whether France was in a mood to accommodate the Indian point of view on the perpetuity aspect on the basis of the flexibility displayed over the pursuit provision. The French delegation was in touch with Paris tonight and was awaiting some fresh instructions in the light of the tough stand taken by India that it would rather call off the new fuel supply arrangement than submit to the French demand for more stringent safeguards than what was provided for in the 1963 agreement.

No Accord Reached

Calcutta THE STATESMAN in English 9 Sep 82 p 1

[Text] NEW DELHI, Sept. 8--The three-day Indo-French talks on the scope of International Atomic Energy Agency safeguards that should apply to the Tarapur power plant ended today without any apparent agreement, reports PTI.

Our Special Representative in New Delhi adds: The two delegations, headed by Mr Jacques Andreani and Mr Homi Sethna, respectively, decided to report on the talks to their Governments.

The External Affairs Ministry spokesman who briefed the Press on the talks said that "both clarified, to each other, their respective positions". The talks, were held "in an atmosphere of great cordiality and understanding"

The spokesman would say little more. His standard answer to all questions was that he was not authorized to say anything further beyond the brief five-sentence statement he read.

He, however, made on significant point, by implication. The two delegations, he said, had discussed the question of supply, "by France in lieu of the USA", of fuel for the Tarapur plant.

In other words, the supply was to be within the framework of the original agreement of 1963 relating to Tarapur and India would not accept any stipulation outside the terms of that agreement: neither the pursuit and perpetuity clauses reportedly included in the French draft sale deed nor its suggestion for a fresh trilateral agreement among India, France and the IAEA safeguards for the material supplied to Tarapur.

These, clearly, were "the various aspects to the question" which the two delegations discussed, according to the spokesman.

India having thus made its position clear, the French delegation which was political in character (Mr Andreani heads the Political Affairs Division in the French Foreign Ministry) will now report back to the French Government on India's objections to the draft sale deed sent last month.

That the Indian delegation at the talks was headed by the chairman of the Atomic Energy Commission, Mr Sethna, is considered significant. Unlike the non-technical officials who participated in the earlier discussions with the USA on its replacement by France as fuel-supplier for Tarapur, the AEC chairman has a clear idea of the likely consequences of acceptance of the French terms of supply, with their reportedly sweeping "safeguards" provisions.

One gathers the impression that the French will not be unwilling to alter the terms of supply--rephrasing them so as to make implict what is now explicit, as a French source said--in the interests of Indo-French relations which right now are very good.

Also, they are not exactly anxious to foul the atmosphere, with several important visits to India due by French leaders. That country's Minister for External trade as well as its Defence Minister are scheduled to visit India early next month. President Mitterand is coming towards the end of November.

The French delegation left for Paris this evening, add PTI and UNI.

Diplomatic sources said the views expressed by the Indian side would be conveyed by the French team to Mr Mitterand.

Analyst on Talks' End

Madras THE HINDU in Eglish 9 Sep 82 p 1

[Article by G. K. Reddy]

[Text] NEW DELHI, Sept. 8--The Indo-French talks on Tarapur safeguards ended inconclusively today without any agreement, after three rounds of detailed discussions that did not lead to any narrowing down of the differences over the proposed application of the pursuit and perpetuity clauses.

A terse statement issued on behalf of the two delegations did not state specifically whether the inconclusive talks would be resumed at a later stage, other than saying that they would report back to their respective governments on the outcome of these discussions--and remain in touch with each other, presumably for a further exchange of views on the subject.

The statement said: "The two sides discussed the various aspects of the question. Both sides clarified to each other their respective positions. The talks were held in an atmosphere of great cordiality and understanding. The two delegations will report on these discussions to their respective authorities. The two sides will be in touch with each other."

Clumsy Language

The clumsiness of the language of this statement clearly reflected the confusion that prevailed at these talks, with both sides taking diametrically opposite positions on the twin issues of pursuit and perpetuity, with no meeting ground at all on either of them. The attempt to conceal the discord and blur the persisting differences by resort to inane expressions could not hide the reality that the talks had ended in a stalemate with little hope of mutual accommodation.

Faith Shaken

The French are, no doubt, under pressure to make a fresh attempt at a higher political level to resolve this problem well before the visit of President Mitterrand to India in November by dispelling the sour note that has crept into Indo-French relations. But whatever the outcome of this controversy, Indian faith in the durability of the French connection has unfortunately been undermined by this sad episode.

The Indian and French delegations concluded the current round of talks with the feeling that there was bound to be another round soon, although the possibility was not spelt out in the joint statement. But the dialogue would be fruitful only if it was resumed at a higher level, with a firm determination to find a solution to the safeguards issue in the larger interests of Indo-French relations.

The U.S. continued to adopt a wait and watch attitude, making no positive contribution to an early resolution of these differences. But it was being kept in touch by both sides with the different formulations that were being discussed for finding a mutually acceptable way out of the controversy over the applicability of the pursuit and perpetuity provisions to the proposed French fuel supply under the 1963 agreement.

Rigidity, a Mystery

It is still a mystery to India why France has chosen to take this rigid stand after adopting a seemingly helpful attitude during the initial stages of the triangular exchanges behind the scenes, before the announcement was made of the alternative fuel supply arrangement during Mrs. Gandhi's visit to Washington. It is not prepared to accept the apologia that what has subsequently been made more explicit was quite implicit in the known French stand that the upgraded International Atomic Energy Agency safeguards will be automatically applied to all its new nuclear transactions.

The next act of this astonishing melodrama will be renewed exchanges between India and the U.S. to determine what exactly went wrong with the earlier understanding bringing France into the picture. But the U.S. seems to be in no great hurry to get India or France out of this predicament without scoring some point in its favour in the bargain.

Sethna to Meet French Counterpart

Madras THE HINDU in English 11 Sep 82 p 9

[Article by G. K. Reddy]

[Text] NEW DELHI, Sept. 10--There will be further exchanges between India and France on the question of nuclear safeguards when the Chairman of the Atomic Energy Commission, Mr. H. N. Sethna, meets his French counter-part, Mr. Pecqueur, in Vienna later this month during the International Atomic Energy Agency's annual conferences.

The two nuclear experts, who have known each other for many years, will be able to take informally a fresh look at the points of divergence even if they are unable to narrow down the differences at this stage.

But if they feel that it would be useful to have another round of talks for exploring the possibilities of mutual accommodation, Mr. Sethna might pay a visit to Paris later, along with some senior officials of the External Affairs Ministry to keep the dialogue going until the two Governments are ready to tackle the problem at the political level consistent with their respective positions.

Reasonable formulation: The leader of the French delegation, Mr. Jacques Andreani, was told quite clearly before he left Delhi that India would in no circumstances submit to the perpetuity clause, while it was ready to discuss and accept a reasonable formulation on the pursuit question reaffirming its commitment to keep the spent fuel and reprocessed plutonium at Tarapur itself in accordance with its understanding with the United States.

There will be some indication of the fall-back French position only after Mr. Sethna, has met Mr. Pecqueur in Vienna and probed his thinking on the perpetuity issue, the crucial point of contention. If the French are inclined to be somewhat flexible on this question, accepting in principle the basic Indian stand that all safeguards on the Tarapur plant and materials of U.S. and French origin must come to an end in 1993 with the conclusion of the 1963 agreement, it should be possible to devise a formula that would preclude any possibilities of the reprocessed French fuel being misused for any unauthorised purposes.

Barnes calls on Rasgotra: The U.S. Ambassador, Mr. Hary Barnes, who returned from this month-long home leave, called on the Foreign Secretary, Mr. M. K. Rasgotra, to discuss the difficulties that have arisen in implementing the recent Indo-American accord to induct France as fuel supplier within the framework of the 1963 agreement. But he had no explanation to offer why France had decided to press for additional safeguards after agreeing in principle to the earlier arrangement.

The French Ambassador, Mr. Andre Ross, who has also been away on home leave, will be back in Delhi by the middle of the month to start preparing for President Mitterrand's visit in November. He will probably come with some further clarifications of the French position to see whether the matter could be amicably settled, or got out of the way by scrapping the new arrangement before the French President's visit.

Meanwhile, the French Air Chief will be visiting India next month on the eve of the French Defence Minister's visit to finalise the mirage-2000 agreement and also discuss India's other defence requirements.

CSO: 5100/7162

DANGERS OF ADHERING TO TARAPUR FUEL PACT DISCUSSED

'THE HINDU' Editorial

Madras THE HINDU in English 8 Sep 82 p 8

[Editorial]

[Text] THE LATEST ROUND of negotiations with the French Government over the terms of fuel supply to the Tarapur atomic power station represents a misplaced search for a compromise on a matter in which no compromise is indicated at all in the national interest. One poorly conceived deal — the skeletal accord announced in Washington on the occasion of the Prime Minister's visit — is now in the process of leading to another, the details of which are likely to have an adverse long-term impact on the nuclear programme as well as on nuclear policy. To recall the relevant sequence of events. In the period following India's Peaceful Nuclear Experiment (May 1974), the U.S. failure to honour a solemnly entered into commitment to supply low-enriched uranium fuel to Tarapur until 1993 led to the breakdown of the bilateral nuclear relationship. Three rounds of negotiations in 1981 failed to resolve the deadlock. With the Indian delegation led by the Chairman of the Atomic Energy Commission, Mr. H. N. Sethna, holding firm to the basic policy postulates (on which the nuclear programme has been developed from the time of Bhabha), a tentative decision was conveyed to free Tarapur from the external constraints and safeguards instituted in a non-performing agreement and run it on indigenously developed mixed oxide fuel (mox). Faced with the prospect of a developing country scoring a significant triumph over its much-vaunted "non-proliferation" policy as well as over the discriminatory international environment, Washington let India face the prospect of economic action, starting with the guillotining of Exim bank credits. In this situation, France was introduced as an alternative supplier of fuel for Tarapur and the 1963 Indo-U.S. agreement for nuclear cooperation was proclaimed as the control framework for the new relationship. As soon as the ink was dry on the skeletal agreement, the U.S. signalled its intention to make reprocessing of India's spent fuel a knotty issue, notwithstanding a position taken in the negotiations that the objection to reprocessing would be given up as part of a package deal. Meanwhile, the French Government (through its Foreign Minister) appeared to make concessions to India in the matter of terms for the fuel supply by reaffirming the decision to stick to the 1963 agreement and by stating specifically that no attempt would be made to control India's reprocessing of the enriched uranium fuel to be supplied. When the fine print arrived through a diplomatic communication, the French interpretation of the deal surfaced in the form of a demand that India accede to key terms of the guidelines, laid down by the London Suppliers' Club, which have been accepted by the International Atomic Energy Agency (IAEA) as the standardised terms for post-NPT nuclear supply relationships. There would be a "perpetuity" clause relating to safeguards (the 1963 agreement is a time-bound affair) and a full-fledged "pursuit" clause covering the derivative fissile material (this was not conceded by India in the original agreement). The compromise attempted in the current negotiations appears to be centred on these two items.

Now, the unorthodox arrangement sought to be concluded among the three governments is undesirable on several counts. To begin with, it would appear to confront the Indian nuclear programme with two nagging spouses instead of one. (Given the best of intentions on the side of Paris, the London Club rules of the game and the updated IAEA concepts which are in line with the global nuclear bargain incline it to a difficult stance.) From the standpoint of Indo-French political relations, it might introduce some source of live contention where there is none at present. With respect to the country's nuclear programme — which deserves unwavering backing at this juncture — the meaning of the "pursuit" clause should be fully understood. Not only will external safeguards and controls apply to the special nuclear material supplied by the member of the London Club. They will chase the derivative fissile material to any and every facility where it may be used; any special nuclear material produced subsequently through the use of this derivative material will also be pursued. Acceptance of the "perpetuity" clause for the short-term gain of a fresh source of fuel supply would transform the entire character of the 1963 relationship (which is quite liberal as nuclear relationships go). In short, acquiescence in the London Club guidelines would introduce the risk of a creeping regime of external restrictions or controls over the recipient country's range of nuclear facilities. Most unfortunately, the very conclusion of the deal with France would seem to undermine plans made by the nuclear scientific establishment to reprocess Tarapur spent fuel for peaceful use in the Kalpakkam test breeder facility. Finally, there is the impact on the work and morale of the scientists and technologists who have been warning against the uncertainties and the risks of a new arrangement for Tarapur that would be messy rather than helpful. We urge the Government of India to have confidence in the experts responsible for the development of the vital field and terminate the danger that the Indian nuclear programme might easily run into.

Amalendu Das Gupta Article

Calcutta THE STATESMAN in English 10 Sep 82 p 8

[Text] It used to be said of the British Government that it welcomed with all the honours due to Commonwealth Prime Ministers, Asian and African politicians whom it had regularly sent to prison. The paradox is even more ironic in the case of Sheikh Mohammed Abdullah who continued to draw tributes from Central and State leaders even during the 14 years of his life after Independence that were spent in detention of one kind or another. Taking into account Maharaja Hari Singh's reign, he must have been in captivity for nearly 16 years. But, of course, he had far more substantial claims to eminence as even his political detractors readily admitted. India would have been a smaller place, in terms of physical as well as moral dimension, without his decisive lead in 1974: nor would Jammu and Kashmir have been so firmly wedded to the secular creed that sustains national integrity. It can even be argued that Kashmir's tragic partition might have been avoided if he had not been in jail when the State was invaded.

The Sheikh sought no higher position for himself than to lead his State; and he certainly did not waver in his allegiance to Indian unity. But within that framework of loyalty he would brook no tampering with what he saw as Kashmir's inalienable rights under Article 370. It became an obsession with him even though circumstances had altered radically since the Instrument of Accession was signed, and effective authority in most matters had been transferred to the Centre through less formal means. The insistence on a legal identity was also exploited by Sheikh Abdullah's political opponents, lately including the Congress (I), to cast unworthy aspersion on his patriotism. He could survive their manoeuvres because of the personal respect he commanded. His tremendous prestige also enabled him to push through measures (the oath of loyalty for Ministers and National Conference MLAs removal of the Speaker, restrictive Press laws or the elevation of relatives to high positions) that were inherently reprehensible and would have provoked bitter opposition if attempted by a lesser man. And then his slackening hold is alleged to have encouraged widespread corruption and a variety of administrative abuses.

Dr Farooq Abdullah may have to bear the brunt of a delayed pubile and political reaction to these later developments. His appointment as acting Chief Minister was in accordance with his father's wishes, though hardly in consonance with respectable democratic usage. But since the new leader has nothing like the same claim on national or State esteem his tenure is likely to witness major qualitative changes. The National Conference cannot, for instance any longer hope to escape critical scrutiny. Whether or not Mr G. M. Shah, challenges his brother-in-law's inheritance, other Kashmiri politicians would be justified in expecting him to prove his credentials and demonstrate his party's ability to run a clean and efficient administration. But the real challenge will probably come from the Centre which may not permit in Dr Abduallah the degree of assertiveness that it tolerated from the Sheikh: Kashmir's relations with the rest of the country may soon have to be recast in a more normal frame.

Communist Newspaper Editorial

New Delhi PATRIOT in English 11 Sep 82 p 2

[Editorial]

[Text]

FRANCE was amongst the important Western powers which refused to sign the Nuclear Non-proliferation Treaty. Generally De Gaulle's France was acutely conscious of asserting its independence in such matters. But slowly and steadily, Paris got dragged into the international traps which circumscribed this independence. As its role as exporter of nuclear technology and material grew, France voluntarily accepted the rules laid down by the London Club. It is, however, to be hoped that on the question of supply of nuclear fuel Mitterrand's France will take a view which is consistent with the independent position proclaimed by it on important policy issues. The atmosphere of growing friendship between this country and France should not be fouled by unnecessary controversies over terms which India, it is known without doubt, will never accept. French negotiators should not try to probe this country's readiness to resist pressures on questions of pursuit and perpetuity. It will only generate an unhappy feeling at a time when this country is looking forward to President Mitterrand's visit, scheduled only a few weeks later.

It is now clear that our officials acted with undue haste in finalising the arrangement on supply of enriched uranium before the Prime Minister's U.S. visit. Many relevant questions which should have been asked and clarified were not addressed to concerned parties. The Political Affairs Committee of the Cabinet was rushed into endorsing the proposal that France should substitute the US as supplier of fuel. In the anxiety to project it as an evidence of success achieved during Mrs Gandhi's visit, the whole issue was dealt with somewhat amateurishly. However, the main task now is to ensure that the nuclear programme is continued without surrender-ing the basic positions that the country has taken so far on important issues of principle. While we should continue to try to secure fuel for Tarapur from external sources without compromising on terms and conditions which we refused to accept under U.S. pressure, it is time to accelerate our own efforts in this field.

Our commercial scale fast-breeder prototype is scheduled to be ready by 1985. This is expected to serve as the basis for the second generation of power reactors after 1990. For one 1000 MW. output reactor of this type we need nearly three tonnes of Plutonium-239 for the initial charging of the core. During a recent Rajya Sabha debate, the Prime Minister revealed that the country has 320 tonnes of spent fuel rods now in storage tanks. By subjecting these to reprocessing we can expect to get one to three tonnes of Pu-239, and the process will take more than two years. Should we not start reprocessing now? No doubt this will make Mr Reagan angry. But if the country does not face the reality now, not only its fast breeder programme but also the use of MOX technology for running Tarapur without imported enriched uranium will be undermined. This will also adversely affect the possibility of utilising our considerable Thorium deposits in Kerala for generating nuclear power. Already, all our programmes in the nuclear field are woefully behind schedule. Further procrastination may gravely jeopardise this vital sector of our development.

G. K. Reddy Analysis

Madras THE HINDU in English 12 Sep 82 p 2

[Article by G. K. Reddy]

[Text] THERE are few issues of national endeavour that have captured the imagination of the Indian elite so profoundly as the country's determination to resist the attempts of the nuclear powers to impose highly discriminatory safeguards in the name of non-proliferation. The firm resolve to assert the sovereign right to engage in legitimate research and development, to tame the atom and harness its energy for peaceful uses, has become an integral part of the Indian emotion.

It has cut across party politics and united the country in according greater priority to what is still a frontier science despite the insidious attempts of some big powers to decry the whole thing as an expensive showpiece that can hardly justify the diversion of scarce resources. Foreign propaganda that a poor country like India can ill-afford to chase this mirage has made no impact, because what India has been spending on its nuclear programme is only a tiny fraction of what others continue to lavish on acquiring or exercising the nuclear option.

Crying wolf

The result is that those who are opposed to India's nuclear development have swung to the other extreme of crying wolf to create the scare that, in refusing to submit to stricter safeguards or self-imposed limitations, India in effect is setting a dangerous precedent for proliferation. The alleged risks involved in allowing a developing country to acquire a degree of nuclear self-reliance are cited as enough justification for stepping up pressures to compel India to forsake the aspiration in the larger interests of world peace.

It is in this context that the members of the London Suppliers Group have been trying to tighten progressively the safeguard provisions to the point of denying countries that refuse to comply voluntarily with these constraints the opportunity to proceed with their indigenous programmes.

No aspect of Indian policy has aroused the same degree of sneaking admiration or strong disapproval among the foreign diplomats in Delhi, depending on their political proclivities and power alignments, as the country's stand against this discrimintion. If India were to cave in, in the face of the mounting pressures, its prestige will suffer considerably in the eyes of the Third World, while the big powers themselves will have little respect for it. The French obduracy has left India with no alternative except to reject the demand for additional and more restrictive conditions even if it meant abandoning the new fuel arrangement.

Heavy price

The latest controversy has also focused attention, in the internal political context, on the pitfalls of a dichotomous approach to a matter of such fundamental importance. There is no logic in continuing to proclaim the virtues of self-reliance, while indirectly diluting the very principle of it on purely extraneous considerations.

In agreeing willy-nilly to keep the Tarapur accord alive, the Government in effect has sacrificed the option to run the plant with the indigenously developed mixed oxide. It is a heavy price that India has been called upon to pay to deny the U.S. the dubious distinction of going back on a solemn bilateral commitment on the basis of its domestic legislation.

In all such matters there has to be a clarity of purpose backed by a readiness to exercise the available choice for achieving the desired objective. India cannot afford to falter in charting out its course of action, if it has to assert itself decisively in the larger national interest. Any vacillation over fundamentals can be disastrous in dealing with big powers bent on exerting pressures to make other countries comply with their directions. A major handicap of Indian diplomacy in dealing with the U.S. and France over the nuclear issue has been the absence of a proper negotiating agency with the authority for discussing the political and technical aspects with full knowledge and self-assurance.

Big powers' doubts

The resistance that India encountered in the earlier stages of its nuclear programme related largely to the strong doubts voiced by the big powers about the need for atomic power by developing countries that were still in the cow dung age, besides the utter disbelief with which they reacted to what was widely regarded as India's over-ambitious plans to tap this new source of energy for its development. It took considerable effort on the part of the late Dr. Homi Bhabha to propagate the theme at various international conferences and carry some conviction that developing nations needed atomic power as much as the developed States for the intermediate stages of their development.

The whole Western attitude at that time was so very patronising that the big powers viewed the Indian nuclear programme as no more than a cottage industry at an embryonic level of development. In 1954 Britain offered to give some enriched uranium fuel elements on loan for a swimming pool type experimental reactor on condition that India built the rest of it which included civil works, design and construction of the tank, electronic controls and prepare for the operation entirely with local staff without outside assistance. It was supposed to be built in competition with the Lido type reactor already at Harwell in Britain.

Achievement

The challenge was accepted and the work was completed in the record time of one year at Trombay and, through trial and error, the Indian nuclear scientists mastered the technology of making the reactor critical under controlled conditions. It was the first nuclear reactor in Asia built and operated entirely by Indian staff except for the enriched uranium fuel given by Britain. It was a remarkable achievement by any standard for a developing nation which began with a modest programme of research only 10 years before to have done so to the great surprise of the big powers which thought it was well beyond India's ability at that time. The reactor which was named Apsara is still in operation at BARC for research purposes.

The second landmark was reached when Canada made a generous gift under the Colombo Plan of an NRX type reactor named Cirus which started functioning in 1960, a natural uranium and heavy water system that was subsequently adopted by India as standard technology for its future nuclear power programme. At that stage Bhabha seemed to favour the Dido type,an enriched uranium and heavy water combination that was in operation at Harwell and tested out successfully for Apsara, but he subsequently veered round to the view that an NRX type was preferable, since India could not afford to get two high flux reactors of different designs and fuel systems going with its limited experience. Two more experimental reactors which were built entirely by India went into operation in 1961 and 1972 and a third one is under construction.

Pokhran test

The big powers became somewhat concerned when India built a plant at Trombay in 1964 to reprocess the spent fuel from Cirus which in theory gave India the nuclear option. The establishment of the Nuclear Fuel Complex in Hyderabad was followed by the construction of a big reprocessing plant at Tarapur, besides a chain of heavy water plants.

The West realised that India was steadily acquiring a degree of self-reliance that could make the country independent of any further foreign assistance. Then came the Pokhran test that set in motion the chain of subsequent developments culminating in the latest French insistence on more stringent safeguards and conditions on the fuel it has agreed to supply for Tarapur under the 1963 agreement.

India did not follow up the Pokhran experiment with further tests to complete the cycle of research and development for peaceful uses. The Janata Government did great harm in affecting the sense of direction and demoralising the nuclear scientists by abruptly halting or curtailing many of the research programmes. Once the momentum was disturbed it became extremely difficult to restore it fully in the face of mounting external pressures. What was essentially an exciting technological adventure got bogged down in a legal wrangle over the rights and obligations under different cooperation agreements.

The unfortunate part of it is that it was initially with the cooperation of France that India learnt a lot about reactor materials, reactor controls and neutron physics particularly with respect to natural uranium systems. It also offered to provide the highly enriched plutonium required for commencing the operation of the fast breeder experimental reactor at Kalpakkam, but subsequently backed out of the commitment.

The Indian scientists are reasonably confident of running the plant with another fuel combination with some design changes, but it would involve in one form or the other use of plutonium obtained from reprocessing which would raise political questions.

The Tarapur plutonium could not be used elsewhere so long as the 1963 agreement with the U.S. is in existence. The only other plutonium available is that obtained from reprocessing the spent fuel of Cirus which is not subject to any safeguards, but the depletion of this stock will impede the experimental work at Trombay.

Hobson's choice

India is thus faced with a Hobson's choice at almost every turn of the running controversy over safeguards and implied threats of economic sanctions. The critics have been pointing to the teething troubles at Tarapur and Rajasthan as evidence of India's inability to keep pace with its ambitious nuclear programme without outside assistance. The real challenge is political in the sense that the policymakers need stronger nerves to be able to cope with the psychological warfare launched by the London Supply Group which incidentally includes the Soviet Union.

And the big powers which are prepared to turn a blind eye at the Israeli and South African bid to acquire nuclear capability have no right to moralise to India which has consciously abjured the right to make nuclear weapons. It is highly unlikely that France would have taken such a rigid stand without some sort of prodding and encouragement from some other members of the London Supply Group which have the monopoly of nuclear trade and have arrogated to themselves the authority to dictate terms to the rest of the world.

CSO: 5100/7163

OFFICIAL REAFFIRMS PEACEFUL PURPOSE OF NUCLEAR PROGRAM

Islamabad THE MUSLIM 24 Sep 82 p 3

[Text] ISLAMABAD, Sept. 23: Mr. Munir Ahmad Khan, Chairman Pakistan Atomic Energy Commission reiterated that introduction of nuclear power in Pakistan was essential to meet our growing electricity needs. This was particularly important in the present circumstances as we were spending about 60 per cent of our total foreign exchange earnings. on the importation of oil he said.

Addressing the 26th annual session of the IAEA General Conference at Vienna the Chairman said that Pakistan was pursuing a peaceful programme of atomic energy consistent with its needs and limited resources. He said besides developing nuclear power, Pakistan was placing strong emphasis on application of nuclear techniques in agriculture, medicine and industry.

He said a comprehensive study undertaken in Pakistan has indicated that a number of nuclear power stations over the next two decades are required to meet a gap of 5000-8000 MW between projected supply and demand. He also stated that the basic infrastructure both in terms of industry manpower and nuclear fuel for the future development and introduction of nuclear power has already been set up due to the experience gained by the Commission in the fabrication of indigenous fuel for 137 MW Power station KANUPP located a Karachi. Underlining the economic aspect of nuclear power generation the chairman, said that under our conditions, a standard nuclear power station will produce electricity more economically as compared to an equivalent oil-fired power plant. He mentioned that Pakistan approved the setting up of a 900 MW light water nuclear power reactor scheduled to be commissioned by 1989 which would be a major breakthrough in the field of nuclear power generation in this country. This reactor, like KANUPP, will operate under IAEA Safeguards, he added.

NON-PROLIFERATION

Munir Ahmad Khan said that in order to ensure a constructive role by nuclear energy it was essential to eliminate threat of further proliferation of nuclear weapons both horizontal and vertical.

He regretted that usually efforts have been made to check the horizontal proliferation while vertical proliferation was ignored. Conservative estimates have indicated the existence of more than 50,000 nuclear warheads which can be unleased at a moment's notice against which there was no defence.

He said that nuclear weapons will not enhance the security of small or less developed countries. Therefore, Pakistan was firmly committed to policy of non-proliferation of nuclear weapons.

He reiterated the Pakistani proposal for the establishment of a nuclear free zone in South Asia to check the production and introduction of nuclear weapons in this region. Expressing his strong faith in peaceful application of nuclear power, the Chairman said that a billion of people living in poverty in our region could not afford the luxury of nuclear weapons at the expense of basic necessities of life.

He, however, clarified that the cause of non-proliferation could not be advanced by pursuing the short sighted policies of denial of peaceful nuclear technology, imposition of restrictions on sharing of nuclear power know-how and equipment through so-called technical fixes.

REPRESENTATION

Strongly advocating the cause of more Third World representation in the IAEA Board of Governors, Mr. Munir Ahmad Khan stressed to resolve this question without further delay to bring justice to the under-represented areas of Africa, Middle East and South Asia. He referred to a compromise formula of a modest increase of one seat each for Africa and Middle East.

CSO: 5100/4301

PAKISTAN'S NUCLEAR CAPABILITIES DISCUSSED

London AL-DUSTUR in Arabic No 251, 13 Sep 82 p 34

[Text] After the Soviet invasion of Afghanistan, the Americans promised to supply Pakistan with various kinds of arms, including F-16 bombers, in order to kill two birds with one stone: strengthen Pakistani forces against a possible Soviet threat and divert the Pakistani government from requesting the nuclear weapon. However, it appears Pakistan did not renounce its nuclear ambitions by accepting the conventional American arms.

The American government warned that the American arms deal valued at $3.2 billion dollars would be suspended if Pakistan insisted on carrying out nuclear tests. But General Zia-ul-Haq's rejection of the warning reflected something more than pure stubbornness or defiance, for Pakistan has given the highest priority to its nuclear projects to the point where it has become difficult to retreat. It has two nuclear projects under way and the competition between them is fierce.

In the Kahuta nuclear plant near Islamabad, a Pakistani team headed by 'Abd al-Salam Khan is trying to enrich uranium. The plant is believed to be striving to conduct nuclear tests using enriched uranium. The apparatus and equipment of the plants have been purchased from a number of European and American countries.

The second nuclear project in Pakistan is under the supervision of the Pakistani Atomic Energy Commission (PAEC). In the 1970's, the Pakistani government tried to buy a plant from France for extracting plutonium from fuel used in the reactor. Because of the pressure exerted by the American government and President Carter, France was forced to withdraw from the agreement. But the PAEC is believed to be itself directing the laboratories now extracting the plutonium.

However, the KANUPP reactor, which is managed by the PAEC, is subject to inspection by the International Atomic Energy Agency (IAEA). Early this year Hans Balchs, director-general of the agency, said negotiations between the Pakistani government and the agency concerning improvement of the inspection staff for the KANUPP reactor made no progress. The PAEC says most of the suggestions of the IAEA were agreed to, but the agency is not yet convinced. Its previous announcements revealed great anxiety about the dangers of converting plutonium.

The problem is the first Pakistani reactor Kahuta is supervised by the Organization of Special Operations. This organization is under the jurisdiction of the Pakistani Army and is now headed by General Chaudhry Habib Zaman. Therefore, any attempt by President Zia-ul-Haq to reduce the role of the Kahuta reactor at the expense of the KANUPP reactor will impair its relations with the army.

Munir Ahmad Khan, chairman of the PAEC, announced that Pakistan will invite foreign countries to participate in the construction of a large nuclear plant in the Chashma region in the Panjab district southwest of Islamabad. The Chashma plant will require enriched uranium equipment from foreign governments. However, President Zia-ul-Haq subsequently spoke about Pakistan's ability to enrich uranium in the Chashma plant.

This self-sufficiency and ability to do without foreign equipment may ultimately free Pakistan from international supervision, although President Zia-ul-Haq keeps saying Pakistan does not have any intentions of producing nuclear weapons either for itself or for any other allied Muslim state. But India is closely observing Pakistan's nuclear projects. In her recent visit to Washington, India's Prime Minister Gandhi complained of the dangers of the Pakistani nuclear development. Also, the Israeli intelligence service was charged in recent years with setting off several explosions in European installations and attacking businessmen with any nuclear ties to the Pakistani government.

A few months ago, Pakistani Minister of Foreign Affairs Agha Shahi declared that his government will, if circumstances require, carry out several nuclear tests despite American warnings. This may create an obstacle to the American arms deal.

5214
CSO: 5100/4303

CONCEPT OF ADVANTAGEOUS NUCLEAR WAR STRONGLY CONDEMNED

Rawalpindi TAMEER in Urdu 19 Aug 82 p 2 & 3

[Editorial: "The Dream of Winning a Nuclear War"]

[Text] The American Defense Department has prepared a new plan which, when completed, they are sure will make it possible for America to win a nuclear war against the Soviet Union. Of the trillions of dollars which will be spent on aspects of its military expenditures and defense arrangements, $1.9 billion will be spent just on arrangements to ensure the continuity of the system.

On the question of whether or not anyone can win a nuclear war, it is the unanimous opinion of the experts that neither America nor the Soviet Union could do so. But let us say that after a decade America is able to win such a war. Even the expenditures necessary for this would be frightful; then the destruction which would result, the loss of human life, the way industries, cities and the centers of culture and civilization which have come into existence after centuries of human labor would be faced with destruction, cannot even be conceptualized. If by thrusting some 50,000,000 or 100,000,000 of its citizens into the mouth of death and enduring the destruction of half its buildings in some nuclear war, America should be successful in killing 100,000,000 or 150,000,000 Soviets and destroying three-fourths of the country, and if those few souls remaining should have the right to call themselves victorious, won't this victory be worse than defeat?

If it is not madness to purchase the danger of such great destruction merely to appease one's anger and to fulfill one's desire to be called the greatest power on earth, then what is it? Whether it be the Soviet Union or America, whatever power dreams of winning a nuclear war is an enemy of its own existence and of the existence of mankind. And this is why all the far-sighted scholars of the world are with one voice demanding the destruction of nuclear weapons.

9914
CSO: 5100/5706

BRIEFS

SOVIET OFFER TO INDIA--Islamabad, Sept. 22: Soviet Union is understood to have offered to build a nuclear power centre in India, VOA reported tonight. The offer was made during talks of the visiting Indian Prime Minister Mrs Indira Gandhi with Soviet leaders. The capacity of the Soviet nuclear power centre will be double of the Tarapur Nuclear Reactor. [Text] [Islamabad THE MUSLIM in English 23 Sep 82 p 1]

ZIA DENIES CHINA'S ROLE--Rawalpindi, Sep. 22: President Ziaul Haq has denied reports appearing in the Western Press that China is supplying nuclear material to Pakistan. He was speaking to a group of foreign journalists here last night. He said that these reports were absolutely incorrect and were apparently designed to embarrass Pakistan and its friend.--APP [Text] [Islamabad THE MUSLIM in English 23 Sep 82 p 1]

NATION TO IAEA BODY--Islamabad, Sept 26--Pakistan was elected as member to the International Atomic Energy Agency's Board of Governors at Vienna for a two-year term yesterday. The polling for this seat was conducted during the 26th annual general conference of the IAEA. This is the 8th time that Pakistan has been elected to the IAEA Board of Governors said a press release of Pakistan Atomic Energy Commission.--APP. [Text] [Karachi MORNING NEWS in English 27 Sep 82 p 8]

ARSHAD REFUTES 'TIMES'' EDITORIAL--London Sept 27--Mr Ali Arshad, Pakistan's Ambassador in the UK has debunked, very forthrightly, the accusation made in THE TIMES editorial on Sept 24 which carried the "misleading impression that Pakistan is in the process of acquiring the capability to make Nuclear weapons." In a letter published in THE TIMES, on top of paper's Letter to Editor page. "The Allegation," the Ambassador says in his letter, "That Pakistan stole any nuclear data from Holland is a pure fib. Our modest-sized nuclear programme is geared solely to peaceful purposes." Concluding, Mr Arshad wrote: "Those who continue to purvey the fiction that Pakistan is making Nuclear bomb are those whose enmity towards Pakistan is beyond doubt. According to a PPI report from London the letter by Mr Ali Arshad, refers to THE TIMES editorial headed "Hindustan and the Bomb." The letter rejects notions that Pakistan wants to use Nuclear technology for atomic weapons, the BBC reported tonight. Mr Arshad wrote that Pakistani Government had been repeatedly declaring that it had no intention of making nuclear weapons. [Text] [Karachi DAWN in English 28 Sep 82 p 12]

CSO: 5100/4304

'CONFIDENTIAL' REPORT OF URANIUM SURVEY NOTED

Bangkok LAK THAI in Thai 26 Aug 82 pp 31, 32

[Article: "A Uranium Survey, a Game Or For Real?"]

[Test] Concerning uranium, during the past 50 years since scientists discovered the importance of this type of mineral, uranium has been used as a raw material to build "atomic" bombs to destroy each other. In the Second World War, Japan fell victim to "uranium."

But after mankind was hurt greatly by the use of atomic energy, very different types of studies were conducted with uranium in order to benefit mankind, with uranium being used to treat cancer and with it being used as a fuel for atomic power plants.

The importance of uranium for peaceful uses has increased continually. This has spurred on exploration for uranium in different parts of the world, and this includes Thailand too.

Recently, the Department of Mineral Resources wrote a "confidential" report on the results of a survey of uranium sources in various region of the country for the director-general of the Department of Mineral Resources so that he could report the results to the cabinet.

This "confidential" report has disclosed that, in the beginning, the survey team of the Department of Mineral Resources conducted aerial surveys of the uranium sources. They found strong indications of radioactivity throughout the Phu Wiang basin area in Phu Wiang District, Khon Kaen Province, and in the surrounding area. The area covers approximately 1,800 square kilometers. Levels of radioactivitiy that were higher than normal were found and so exploratory drilling will be done.

The "confidential" report of the Department of Mineral Resources also said that layers of sandstone having characteristics similar to those in the Phu Wiang basin where uranium was first found were surveyed. Surveys were conducted throughout Chaiyaphum, Khon Kaen and Udorn Thani provinces and in surrounding areas. The area surveyed totalled about 3,000 square kilometers.

Sandstone having such characteristics was found in the Phu Kao area in Non Sang District and in the Wua So basin area in Nong Wua So District, Udorn Thani Province, and in the Ban Khwao area in Khwao District, Chaiyaphum Province. The Department of Mineral Resources has plans to conduct more detailed surveys in these uranium locations as called for in the Fifth Economic Development Plan, which will expand on the initial surveys called for in the Fourth Economic Development Plan.

As for other uranium locations that may turn out to be important uranium sources, initial surveys covering 1,800 square kilometers have been conducted in Chiang Mai, Chiang Rai, Mae Hong Son and Lampang provinces.

The surveys of 11 tertiary basins, which are basins that have rock in which uranium is found, showed that four ofthe basin areas may contain uranium. The four are the basin area in Pai District in Mae Hong Son Province and the Om Koi, Bo Sam Li and Fang basin areas in Chiang Mai Province. More detailed surveys will be conducted later on.

Besides this, these surveys have also surveyed locations in which uranium may be present with fluorite. These surveys were conducted in the area of the Ling King Fluorite Mine at Ban Doi Tao in Doi Tao District, Chiang Mai Province. At present, the Department of Mineral REsources is conducting a detailed survey.

At the same time, the Department of Mineral Resources has surveyed triassic and carboniferous-period granite in Chom Thong, Mae Taeng and Fang districts in Chiang Mai Province and in Mae Sa Riang and Pai districts in Mae Hong Son Province. Granite with a uranium content of 1.6-23 parts per million was found.

In conducting these initial uranium surveys, the Department of Mineral Resources used vehicles to which were attached instruments for measuring radioactivity. The vehicles travelled through various areas measuring the level of radioactivity. This was done in Nakhon Ratchasima, Chaiyaphum, Khon Kaen, Udorn Thani and Phetchabun provinces and in some parts of Loei and Chiang Mai provinces.

The survey found that the level of radioactivity in these areas is higher than normal. Thus, there are prospects of finding uranium in the Ban Doi Nok Yieng Kao, Ban Han and Ban Sai Khlong areas in Kaset Sombun District and in the Ban Pracha Samakhi and Ban Non Salao areas in Phu Khieu District, Chaiyaphum Province, and in the Ban Doi Tao area in Doi Tao District, Chiang Mai Province.

As for the detailed studies conducted by the Department of Mineral Resources in the Pratu Tima area in the Phu Wiang basin in Phu Wiang District, Khon Kaen Province, the department used geological, geochemical, geophysical and radiometric methods and did exploratory drilling in order to determine the amount of uranium ore reserves.It also did drilling in order to study the rock strata and the accumulation of uranium at greater depths. It sunk 201 holes for a total depth of 5,464.45 meters.

Uranium was found at depths ranging from about 3 meters to 38.5 meters in three pockets. The survey found that there was approximately 31,000 metric tons and that the average quality was 0.04 percent $U_3 O_8$.

As for the final results of the survey, this "confidential" report discussed the weaknesses. It said that the instruments used to measure radioactivity that were attached to the vehicles and the instruments used to measure radioactivity in the holes that had been drilled frequently broke down. Each time, much time was wasted fixing the instruments since parts had to be ordered from abroad. Thus, the work proceeded very slowly.

Besides this, during the exploratory drilling, sometimes it was not possible to carry on the work because of heavy rain, which made it impossible to move the drilling equipment to the area where drilling was to take place. At the same time, the means of transportation used to make the surveys was limited. Most of the vehicles were old vehicles that broke down frequently.

The foregoing is a "confidential" report on the results of the surveys of uranium locations in Thailand. It is an international survey report. But because of the fact that the capital and equipment used in the surveys was very limited, the uranium surveys conducted by the Department of Mineral Resources were actually just "amusement" type surveys. They were just "makeshift" surveys.

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CNEN CHIEF CARVALHO RESIGNS, REPLACED BY SECRETARY NAZARE

Rio de Janeiro JORNAL DO BRASIL in Portuguese 7 Sep 82 p 15

[Text] As of tomorrow, the new chairman of the National Nuclear Energy Commission (CNEN) will be the present executive secretary of the agency, Rex Nazare. He will replace physicist Hervasio de Carvalho, who held the CNEN chairmanship for 13 years and who yesterday morning presented his request for resignation, for reasons of health, to Minister of Mines and Energy Cesar Cals, in Brasilia.

Rex Nazare confirmed in Rio yesterday that "around 10 o-clock in the morning" he received a telephone call from Minister Cals inviting him to head the CNEN. Hervasio de Carvalho--who, the minister observed regretfully yesterday, "is a man who has an international reputation, and it is too bad that he has requested his resignation for reasons of health "--will hold the recently created position of special assistant to the minister for energy affairs. He will deal specifically with the areas of advanced technology such as nuclear fusion, fast breeder reactors and solar energy.

Seventh President

Rex Nazare is the seventh president of the CNEN. Since it was created in 1956, the National Nuclear Energy Commission has never had a chairman who remained in his position as long as Hervasio de Carvalho, who broke all records with 13 years on duty. The one who remained as CNEN chairman the shortest period of time was Arthur Mascarenhas Facanha: 1 and a half months. The first chairman of the CNEN was Admiral Otacilio Cunha.

"Rex Nazare related last night that: "Professor Hervasio felt that his health condition did not permit him any longer to keep up the pace of work that he had maintained for more than 12 years and decided to place the position at the disposition of the minister. He is going to Brasilia today to talk to Minister Cals before his installation Wednesday.

Nazare hesitated a little when he was asked if he planned to make changes in the CNEN and requested that he answer that type of question after he had already been installed. Nevertheless, he declared: "Every program of the CNEN is dynamic and, therefore, has to be adapted to new facts." In the meantime, Nazare emphasized repeatedly that he always had an excellent relationship with Hervasio de Carvalho.

At 11 o'clock in the morning yesterday, Hervasio de Carvalho was received by Minister Cesar Cals, to whom he presented his request for resignation. The two spoke for almost half hour and Hervasio decided to remain in the Deliberative Committee of the National Nuclear Energy Commission. Thus, he will not be completely detached from the CNEN. The deliberative committee acts as a council that analyzes all the decisions of the agency and the vote of the councilors carries weight in any decision taken by the CNEN.

Hervasio, 66 years of age, who suffered a heart attack last year, felt it impossible to shoulder all the responsibilities and tasks of the CNEN. According to aides of Minister Cesar Cals, that was the only reason why the CNEN chairman requested his resignation from the position.

Although all yesterday afternoon, Hervasio de Carvalho's secretary, Dona Wilma, insisted on advising that he was in Vienna and would stay there until the end of the month to participate in the International Atomic Energy Agency (IAEA) conference, Hervasio was in Brasilia and arrived at the headquarters of the CNEN in Rio after lunch. And the one who will leave for Vienna within a week will be the new CNEN chairman, Rex Nazare. He spent yesterday preparing to preside over a meeting in the IAEA on the 17th on the effects of Three-Mile Island.

The New Chairman

Rex Nazare Alves, soft-spoken and deliberate, a native of Rio, 44 years of age, spent almost all his nuclear career in the National Nuclear Energy Commission, which he will head as of tomorrow. A graduate in physics from the State University of Rio de Janeiro, and in nuclear engineering from the Military Engineering Institute, Rex Nazare in 1968 defended his doctoral dissertation, also on nuclear energy, at the Sorbonne in Paris.

He entered the CNEN in 1964 where he was working in the Nuclear Engineering Institute on the physics and chemistry of fission. From 1969 to 1975, he headed the Institute of Radio-Protection and Dosimetry. Finally, in February 1975, Nazare was invited to the executive board of the CNEN to replace Admiral Otacilio Cunha. Since 1980, he has also been the nuclear energy advisor to the Secretariat General of the National Security Council.

Rex Nazare, who before he rose in his "nuclear career" was even head of a college, is known to be an indefatigable worker. Even yesterday, despite having received the invitation from Minister Cals to become chairman of the CNEN, he stayed at work in his office at the CNEN until after 1900 hours.

The First Doctor in Nuclear Engineering

University of Chicago, 1953: The first doctoral degree in nuclear engineering was not granted to an American or a European but to a native of Minas and a Pernambucan at heart: Hervasio de Carvalho, who has just resigned as chairman of the National Nuclear Energy Commission for reasons of health.

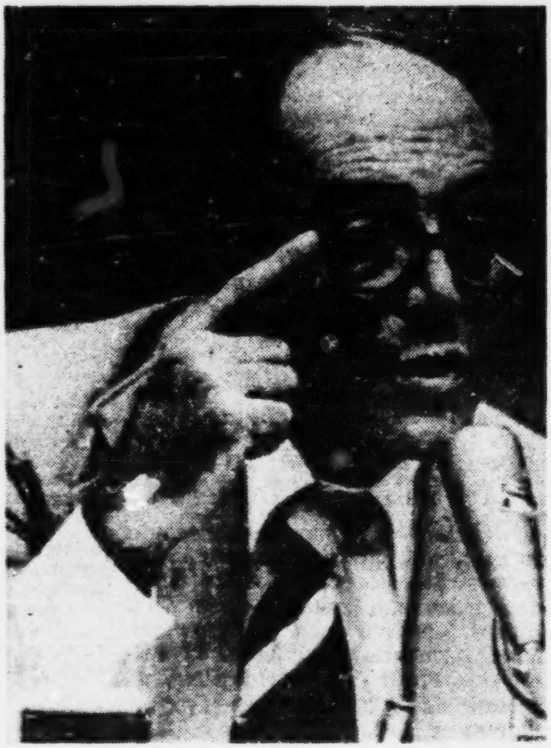
The son of a doctor, Hervasio was born in Araguari, Minas Gerais, in 1916. In Recife, where the family had moved, he began his studies in engineering and law at 16 years of age. In 1940, Hervasio and another famous physicist, Jose Leite Lopes, went to Rio for the carnival and just as a joke register for the engineering college entrance exams of the University of Brazil. Leite Lopes passes in first place and Hervasio in second.

After working as a university professor in Campinas, he traveled to the United States and registered for the first atomic engineering course of the University of Chicago, where he completed his doctorate in 14 months. In 1967 he repeated his success in Italy, in the group of Professor Amaldi (disciple of Enrico Fermi, one of the fathers of the atomic bomb).

Before heading the CNEN for more than 12 years and being responsible in large part for structuring the present nuclear policy of Brazil, Hervasio de Carvalho was one of the most active researchers in the country: between 1961 and 1967 alone he published 73 specialized works. Of him, his successor Rex Nazare said yesterday:

"Professor Hervasio was the great lever that made possible the formulation of a number of programs that are being developed in the country today."

Rex Nazare is the seventh to take over the CNEN



Hervasio left for reasons of health

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NEW CNEN CHAIRMAN INSTALLED, SUGGESTS POLICY CHANGES

Possible Policy Changes

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 7 Sep 82 p 31

[Text] Rio--The new chairman of the National Nuclear Energy Commission (CNEN), Rex Nazare Alves did not want to confirm or deny that the departure of Professor Hervasio de Carvalho was caused by cuts in appropriations for agency programs, explaining further that the CNEN will not necessarily have the same policy it received previously.

Rex Nazare said in Rio last night thay any program such as that of a nuclear agency has to be dynamic and has to adapt itself to new facts, pointing out that Professor Hervasio de Carvalho no longer felt in condition to give the same drive he had been giving to nuclear activities and placed his position at the disposition of Minister Cesar Cals.

The new CNEN chairman acknowledged that Hervasio de Carvalho was the great lever that made possible the development of the Brazilian nuclear program, and for 12 years he headed the CNEN, having been also one of the mentors of the nuclear program and acted as special advisor for nuclear affairs to the National Security Council. Paulo Nogueira Batista, in the diplomatic part, and Hervasio de Carvalho, in the scientific part, were the ones responsible for the German-Brazilian nuclear program, which gave birth to the Brazilian Nuclear Corporation (NUCLEBRAS) and its subsidiaries. According to Rex Nazare Alves, Hervasio is a scientist enamored over nuclear energy and everything he has done in the sector. Sixty-six years of age and in good physical condition, he, nevertheless, felt tired and will now be the minister's special advisor for the National Institute of Plasma and Nuclear Fusion.

Rex Nazare Alves was always considered the right arm of Hervasio Guimaraes de Carvalho, also advisor of the National Security Council and of the Presidency of the Republic. He is a native of Rio, 44 years of age, a graduate in physics from the State University of Rio de Janeiro, in nuclear engineering from the Military Engineering Institute, and has a doctorate from the University of Paris. He headed the Institute of Radio-Protection and Dosimetry from 1969 to 1975, when he was invited to replace the then executive director of the CNEN, Octacilio Cunha, who had died. Rex Nazare Alves has been in the National Nuclear Energy Commission since 1964. Previously, he worked in the Nuclear Engineering Institute (IEN), on research in the physics and chemistry of fission.

Since its founding in 1956, the National Nuclear Energy Commission has already had the following chairmen: Octacilio Cunha, Marcelo Damy, Artur Mascarenhas Facanha, Professor Cintra do Prado, Uriel da Costa Ribeiro, Hervasio Guimaraes de Carvalho, and now, Rex Nazare Alves. The installation of the new CNEN chairman is scheduled for tomorrow in the office of Minister Cesar Cals in Brasilia.

The National Nuclear Energy Commission is the agency that is responsible for all control and inspection of the Brazilian nuclear program and the other agencies and research institutions which in any way deal with nuclear energy in Brazil.

Necessary Adaptations Promised

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 9 Sep 82 p 32

[Text] Brasilia--The new chairman of the National Nuclear Energy Commission (CNEN), Rex Nazare Alves, was installed in Brasilia yesterday in the office of Minister of Mines and Energy Cesar Cals, promising to make the necessary adaptations to the dynamics of the nuclear program and the development of the country. However, he did not wish to cite those adaptations. His predecessor Hervasio Carvalho, who had headed the CNEN for the last 13 years, denied that he had left his position because of differences with the Brazilian Nuclear Corporation (NUCLEBRAS).

Witn regard to the nuclear program, Carvalho limited himself to saying that he is happy to see what he planted flourish. He thanked former President Costa e Silva, who appointed him to the chairmanship of the CNEN, former Presidents Medici and Geisel, and President Figueiredo, and concluded that his debts of gratitude "are as great as those of Mexico. If I had to pay them all I would go bankrupt."

Carvalho pointed out, in denying any differences with NUCLEBRAS, that he got along well even with the scientific community. "The scientific community had the habit of attacking the nuclear program but it always spared me perhaps because I was a member of the Academy of Sciences," he observed. He pointed out also that he always sought to listen to opinions "but I never let anybody run my commission."

Isolation

The departure of Provessor Hervasio de Carvalho from the CNEN, according to the opinion of representatives of the Sao Paulo scientific community, means a victory for NUCLEBRAS. The result of that, according to the scientists commenting, will be better coordination between NUCLEBRAS and CNEN which, in practice, will result in a greater isolation of the nuclear program under the pretext of sparing it from the criticism of society as a whole and from the technical-scientific community in particular.

Despite expressing a number of reservations about the performance of Hervasio de Carvalho, Sao Paulo scientists and technicians admit at least one positive point in it: his close connection, even professionally since he is a physicist, with the International Atomic Energy Agency (IAEA), an organization with headquarters in Vienna, Austria, which supervises the use of nuclear energy by the countries that have that technology.

The scientists commenting point out that until 1968, the Brazilian scientific community had been supporting the nuclear policy followed by the country, thereafter assuming an ever more criticial position. The last suggestion presented to the government, which if accepted could have reopened the dialog, was the strengthening of the CNEN, separating it from the Ministry of Mines and Energy. According to that proposal, which was not accepted, the CNEN would have become an independent agency subject only to the Presidency of the Republic and thus would have sufficient power to strictly oversee the possible policy errors in that sector.

For his part, the director-superintendent of the Institute for Energy and Nuclear Research (IPEN), Ernani Amorim, told O ESTADO thatthe resignation of Hervasio de Carvalho from the CNEN was due exclusively to problems of health. He denied the existence of differences between NUCLEBRAS and the CNEN. In Amorim's opinion, Nazare Alves will follow the same policy as his predecessor and the best proof of that, according to him, was the invitation of Minister Cesar Cals to the former chairman of CNEN to be advisor to the Ministry of Mines and Energy.

In the opinion of Federal Deputy Horacio Ortiz (Brazilian Democratic Movement Party (PMDB) for Sao Paulo), a member of the Mines and Energy Committee of the Chamber of Deputies: "Unfortunately, nothing is going to change with the resignation of Hervasio de Carvalho because both he and his successor are from the same team, both are supporters of the nuclear program, which has already been shown to be unnecessary, at least until 2020."

Ortiz believes that the program will be maintained despite the shortage of funds for the nuclear plant projects envisaged in the agreement with Germany. As regards the role of the AIEA, the deputy disagrees with the scientists because he believes that it is maintained exclusively by the "Atomic Club" to prevent any nuclear development, even for peaceful purposes, in the countries of the Third World.

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CALS CONFIRMS ALTERNATIVE URANIUM ENRICHMENT RESEARCH

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 24 Sep 82 p 26

[Text] Rio--The Brazilian Nuclear Corporation (NUCLEBRAS) called a press conference to distibute an official note from Minister of Mines and Energy Cesar Cals denying the report published yesterday by O ESTADO and JORNAL DA TARDE, but only confirmed most of what we had reported. After denying that the Brazilian Government is going to revise or slow down the nuclear program, the note, in paragraph 2, says textually: "The report that the government has turned toward the development of two alternative lives of uranium enrichment because it does not trust the technical and economic feasibility of the centrifugal jet (jet-nozzle) process, as the newspaper reported, is without foundation."

Immediately afterwards, in paragraph 5, the note of the minister of mines and energy confirms the report of O ESTADO and JORNAL DA TARDE:

"The government's decision to develop research programs related to other alternative technologies in the uranium enrichment area is perfectly compatible with the industrial program already underway for the utilization of the centrifugal jet process. It is a matter of opening up alternatives in the mastery of technologies in the nuclear area, establishing a new and desirable scale of values."

Following is the full text of the note from Minister of Mines and Energy Cesar Cals:

"With reference to the report published in the newspaper O ESTADO DE SAO PAULO today, 23 September, under the caption "Brazil Slows Down Program With Germany," the minister of mines and energy makes the following clarification:

1. The report that the Brazilian Government has decided to revise and slow down its nuclear program is without any foundation; it continues to be carried out within the time periods envisaged and established by the government.

2. The report that the government has turned toward the development of two alternative lines of uranium enrichment because it did not trust the technical and economic feasibility of the centrifugal jet (jet-nozzle) process, as the newspaper reported, is also without foundation.

3. What there is with reference to uranium enrichment is an industrial program developed by the NUCLEBRAS, through its subsidiary, NUCLEBRAS Isotopic Enrichment Corporation (NUCLEI), and a research program developed by specialized institutes, having very different objectives and scale of values. The objective of the industrial program is the installation in Resende Municipality, of an enrichment plant utilizing the centrifugal jet process, with completion of the first stage in 1983, the second in 1986 and an extension of that plant in 1988. The work of installing the NUCLEI plant, already in the equipment installation phase, is well underway.

4. The feasability of the centrifugal jet enrichment process has already been proved on a laboratory scale and on a pilot scale. The installation of the plant in Resende is aimed at optimizing the process, which is normal in the development of any technology.

5. The government's decision to develop research programs related to other alternative technologies in the uranium enrichment area is perfectly compatible with the industrial program already underway for the utilization of the centrifugal jet process. It is a matter of opening up alternatives in the mastery of technologies in the nculear area, establishing a new and desirable scale of values."

Not Being Abandoned

Minister Cesar Cals declared that the jet-nozzle uranium enrichment process will not be abandoned "but that at the same time we are not obliged to remain restricted to only that process of technological development. We are pursuing and developing research of other processes of uranium enrichment, and resources will not be lacking for that purpose."

The minister of mines and energy also confirmed that an institute will be installed in Itaguai, in a place called Campo de Roma, to assemble in a single site all the task forces that are doing research and work with plasma physics and nuclear fusion in Brazil, now spread out in universities or other agencies.

He pointed out also that the nuclear program called for nine nuclear plants and that it will be fulfilled by the year 2000 because that program is aimed at mastery of the fuel cycle technology, and the uranium enrichment process by centrifugal jet will be accomplished.

Cals said that he was personally in Germany, visiting the Siemens facilities and checking the current stage of technological development of the nozzle and dispelling his doubts. In his opinion, "if Siemens itself showed its readiness to build a factory for elements (nozzles) and components of the process in Curitiba, it is because the Germans believe in that process."

This time, the minister of mines and energy did not again justify the nuclear program on the basis of the country's energy needs but rather "because that program was fully paced so as to give continuity to scientific training and the education of specialized personnel, as well as to establish a nuclear energy industry. How can we lead the private entrepreneur to prepare himself in terms of the training of personnel, safety control and quality control if we do not lend continuity to the nuclear program?" asked Minister Cesar Cals, in conclusion.

Ministry Says Nuclear Program Will Be Fulfilled

In an official note yesterday, the Ministry of Mines and Energy denied that the Brazilian Government has decided to revise or slow down the nuclear program. "The program continues to be carried out and within the time periods established by the government," says the note. The ministry also denied that the development of two alternative lines of uranium enrichment on the basis of laser rays and ultracentrifugation is due to suspicion that the jet-nozzle centrifugal jet process purchased from the German KWU company is technically and economically vulnerable.

The note from NUCLEBRAS in Rio de Janeiro, sent to the ministry by Telex, however, does not confirm or deny the report by O ESTADO that the jet-nozzle uranium enrichment process by the double deflection system will raise the cost of the demonstration plant that is under construction in Resende (Rio de Janiero), from $282 million to $1.5 billion.

"What there is with reference to uranium enrichment" adds the note "is an industrial program developed by NUCLEBRAS, through its subsidiary, NUCLEBRAS Isotopic Enrichment Corporation (NUCLEI), and a research program developed by specialized institutes, having very different objectives and scale values. The objective of the industrial program is the installation in Resende Municipality of an enrichment plant utilizing the centrifugal jet process, with completion of the first stage in 1983, the second in 1986 and an extension of that plant in 1988, already in the equipment installation phase. The work of installing the plant is well underway."

The ministry note points out also that the feasibility of the uranium enrichment system by centrifugal jet has already been proved on a laboratory scale and on a pilot scale. According to the note, the installation of the Resende plant for uranium enrichment using the centrifugal jet process is aimed at "optimizing the process, which is normal in the development of any technology."

Finally, the note explains that the government's decision to develop research programs related to other alternative technologies in the uranium enrichment area "is perfectly compatible with the industrial program already underway for the utilization of the centrifugal jet process, aimed at opening up alternatives in the mastery of technologies in the nuclear area."

NUCLEBRAS

In Rio, NUCLEBRAS, through its press aide, Cesarion Praxedes, refused to provide any clarification about the main problems of the jet-nozzle uranium enrichment process, alleging that such matters are "strategic and in the area of national security."

According to the NUCLEBRAS spokesman, no director of NUCLEI could provide any explanation about the jet-nozzle process because that "was not being done anywhere in the world." And added: "Go to URENCO and ask how many centrifuges are in operation and at what cost to see if they tell you."

So the public remains ignorant of the reason that led the Germans to sign a shareholders agreement in which they disavow any and all responsibility for the future failure of the jet-nozzle technology.

Another basic point that NUCLEBRAS refuses to explain is the cost. Originally, an industrial plant was planned in which the process was based on a system called single deflection and a compound of hydrogen gas and uranium hexafluoride. That unit would cost $282 million but its economic feasibility was problematic because its production rate--the Separation Time Unit (UTS)--was $5,000, compared to $600 for the ultracentrifuge.

A new industrial plant was then planned to be to be coupled to the first one, based on an improved system of dual deflection and a compound of helium gas, since hydrogen gas cannot be used in large industrial units because of the danger of explosions. It so happens that installation costs increased with the second unit, from $282 million to $1.5 billion, so that the small gain in economic savings from the process does not justify the brutal increase in the cost of the fixed installations. In addition, that industrial complex will require a fixed and permanent consumption of 1.5 million kilowatt-hours for its operation, or the equivalent of a medium-sized hydroelectric plant operating exclusively for the Resende uranium enrichment plant.

KWU Belives That Slowdown Is Uneconomical

The spokesman of KWU-Kraftwerk Union in Brazil, Wolfgang Breyer, said yesterday that Brazil is already slowing down the nuclear program but you reach a point where it is no longer possible to do so at the risk of making it uneconomical and losing all the work done in educating personnel and training as well as demobilizing Brazilian private enterprise that invested in it.

With regard to the nuclear reactors, Breyer revealed that there are commercial contracts for the purchase of the Angra-2 and Angra-3 units only, each in the amount of $1.84 billion. For plants 3 and 4 to be built in Iguape, on the Sao Paulo coast, there is only the negotiation of commercial contracts, in which the maximum and minimum participation of Germany and Brazil will be stipulated; the intention being that there be a minimum of 70 percent national participation on the average for the two.

Wolfgang Breyer explained that the delays already effected in the nuclear program will benefit Brazil because the average of national participation for Angra-2 and 3, formerly set at 55 percent could be increased. In this connection, he pointed out that the pressurizer for Angra-3 will be built in Brazil, contrary to what had been planned.

In his view, there is no slowdown in the transfer of the fuel cycle by Germany; "it is less off-schedule than the construction of the nuclear reactors." With regard to the jet-nozzle project, he said that the research is being developed in a normal way in the Karlsruhe laboratory in Germany, a big program having been set up in order to increase the scale of the components of the commercial plant.

Breyer pointed out also that several countries that hold uranium enrichment patents are doing research with laser rays and with the chemical method in an attempt to improve the economic feasibility of those processes. In his opinion, "Brazil is free to research other technologies not included in the nuclear agreement."

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COLUMNIST PRESENTS CASE FOR BRAZILIAN BOMB

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 2 Sep 82 p 2

[Article by Mauro Chaves: "A Reflection on the Bomb"]

[Text] From time to time, accusations have emerged abroad about the technological possibilities, the veiled intentions, the political decision already taken (and well camouflaged) and even the possible concrete "preparations," pertaining to the manufacture of our first atomic bomb, which allegedly is within the secret capability of our ongoing nuclear program stemming from the notorious Brazilian-German agreement.

In June of last year, Professor David Lanning of the Nuclear Engineering Department of the Massachusetts Institute of Technology (MIT) declared that in only 1 year after Brazil's nuclear facilities go into operation, "they will be able to produce, plutonium in sufficient quantity to build a considerable arsenal of atomic weapons."

Last month, the German magazine DER SPIEGEL published material (reprinted by the JORNAL DA TARDE) on the "atom bomb" plans of the Brazilian military and their acceleration after the Malvinas war. According to the weekly, there is allegedly a broad plan under the supervision of the National Security Council that is aimed at giving our armed forces total mastery of military nuclear technology: the air force allegedly is quite advanced in research conducted at the Aeronautics Technology Center (CTA) in Sao Jose dos Campos, not only in connection with construction of the bomb properly speaking but also in the development of missiles to carry the nuclear weapons; while the army is allegedly expanding its research center in Marambaia to house laboratories as complete as those of the CTA. The Navy, in turn, is allegedly devoting itself to nuclear submarine research, with regard to which the magazine expressed the serious suspicion that the announced plan to purchase two German submarines of the IKL-209 type is directly connected with that research.

As always happens, those charges have merited the flattest denial from the Brazilian military authorities, who always assert and reassert that use of nuclear technology for military purposes has never figured in our plans since our desire is to use it for exclusively peaceful purposes--which, furthermore, is the position we have adopted in all the international forums in which the subject is discussed.

Very well. With regard to those denials, "there are always two possibilities," as the character Jacobowsky played by Danny Kaye in the film, "The Colonel and I," used to say. That is: either the military are not speaking the truth and there really are well-advanced plans for the manufacture of a native A-Bomb--a deception that is perfectly justifiable in such a case, inasmuch as no nation boasts of its own bomb before exploding it; or the Brazilian military are telling the truth--a possibility in which we do not have any prospect of entering the Atomic Club, which could lead us to a great surprise, a great fright (or panic?) on the fine day when the first Argentina A-Bomb explodes (experimentally, of course), blasting into the radioactive air the pages of the Treaty of Tlatelolco and everything else.

To better reflect on these two possibilities let us go back in time--15 years. In May 1967, the then President Costa e Silva made a thunderous speech in Urubupunga which resounded for many weeks in the national and international press. The marshal spoke out enthusiastically about the need for our nuclearization, speaking expressly about "atomic explosions" for our development, such as the opening of interconnecting river canals in the Amazon, etc. In the meantime, in an interview granted to the JORNAL DA TARDE, the then Foreign Minister Magalhaes Pinto announced that our first atomic bomb would be built during the Costa e Silva administration. So the subject of the "Brazilian A-Bomb" entered the order of the day, and the most "pessimistic" predictions were that it would still be 6 yeras before we would explode our bomb--consequently, it would explode in 1972. (At that time, the magazine TIME published a report which stated that "any industrial society will be able to build its own bomb similar to the one that razed Hiroshima within 5 years and with $100 million.")

With the advent of the Brazilian-German agreement, and the consequent development of our nuclear program, Brazilian official talk changed completely; they began to speak exclusively about nuclear energy and never about "atomic explosions." Thus a cyclopean, very costly, long-term program was formulated, beyond our economic possibilities and real energy needs, plunging us into debt up to the hilt, but for some unexplainable scruple there was no mention of any need for us to acquire the status of atomic power; there was no mention of national defense (in a military system so concerned with national security); of what the long-term protection of our immense territory means; of the right we have to manufacture the bomb--since if other "Third World" countries already have it, why not we? And why have we up to now stubbornly refused to sign the "Nonproliferation Treaty"?

Sometimes we are left imagining that in these 15 years there has been a great detour--so great to the point of our having "tied ourselves up" in so many antibomb commitments, stemming from clauses of the nuclear agreement itself--that we are much farther away from the bomb than 15 years ago. (And what if the TIME recipe was correct and we could have built it for only $100 million and without any nuclear agreement?)

The fact that no one has succeeded in giving a convincing explanation for our nuclear program perhaps stems from the fact that on the way we have "forgotten" the original, real motivations...

On the other hand, we believe that a certain antimilitaristic delight--quite understandable in societies subjected for long years to politico-military tutelage--may lead many to regard any consideration regarding the need for a Brazilian bomb as a real absurdity, an "arms race," a taboo, a sin. But let us agree: the Atomic Bomb is still comprised in its majority of representative democracies. And if there is one type of weapon not susceptible to being used internally by dictatorships for the intimidation of a civilian society, it is the nuclear weapon. Now, as for the ecological-perservationist aspect, we can observe that in no country belonging to the Atomic Club has there been so much disregard for nature, so much depredation of the environment as that prevailing in the absolute majority of the Third World and non-nuclear countries.

In view of all of that, why do we not put aside our false temptations, and once and for all get the bomb into our head before some adventurer of the Galtieri type gets his hand on it?

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SAO PAULO TO BE SITE OF REMAINING SIX NUCLEAR PLANTS

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 22 Aug 82 p 49

[Text] Brasilia--The remaining six nuclear plants of the total of eight units in the Brazilian-German agreement will be built in Sao Paulo, on the coast between Peruibe and Iguape, according energy sector experts. Formalization of this decision by the Brazilian Nuclear Corporation (NUCLEBRAS) reportedly depends only on the reuslts of the studies to be conducted by the Brazilian Electric Power Stations Corporation (ELETROBRAS) and by the Sao Paulo Power Company (CESP), to identify the influence of the state's electric energy market on the Southeast region. This region consumes about 60 percent of all the electric energy generated in the country.

According to the sources, three factors led NUCLEBRAS to decide on the construction of the six nuclear plants in Sao Paulo: to utilize the siting studies conducted by the American Kaiser Engineering Corporation in the Sao Paulo coast, considering that this type of study is very expensive and requires a long time. It is no longer necessary to conduct a public opinion campaign because the Sao Paulo population has already accepted the construction of two plants on its coast (Iguape-I and II). Sao Paulo is the state that consumes the most electric energy, therefore, it is the region that is going to require an increase in its installed energy generating capacity when the country's economy emerges from the present recessive phase.

However, no date has been set for the beginning of construction of the six plants although Iguape-I and II are in the phase of preparation of their project beds and Minister Cesar Cals has officially announced that the construction of four nuclear units is going to be begun during Figueiredo's administration. Only two construction projects have been begun during the current administration, in Angra dos Reis. The projects of the remaining four units under the Brazilian-German agreement will not be begun until the next administration, according to Cals' announcement early this year, when he defined "Plan 2000," a document that forecasts the generation and consumption of electric energy in the country until the end of the century.

Energy sector exports have reported that in addition to the 1-year delay in the date scheduled for the entry into operation of Angra-II, going from 1986 to 1987, the nuclear program will undergo new delays in the event that the official forecast of the increase of electric energy consumption in the country is not confirmed: in the order of 7.7 percent per year until 1984 and after that date a faster increase of 10.8 percent per year.

They explained that the electric energy companies are decapitalized and have debts of approximately 80 billion cruzeiros to pay this year because of the 3 percent drop in the consumption of electric energy in 1981 compared to previous years, when consumption was growing at an average of 10 percent per year. ELETROBRAS is predicting an increase of consumption of 6.5 to 7 percent for this year. And in the event that these percentages are not confirmed, the electric sector will not even have the renevues to touch the current projects let alone begin new ones. The projects in the electric sector add up to 22 hydroelectric plants, 2 nuclear plants (Angra-II and III) and 2 thermoelectric plants, one in Rio Grande do Sul and the other in Santa Catarina.

By 1992, the installed energy generation potential will increase by more than 40,000 megawatts. Of this total, 2,200 megawatts pertain to the hydroelectric plants that will go into operation this year and Angra-I in 1985. In the meantime, the current surplus of energy is in the order of 2,500 megawatts. That surplus will grow significantly after 1983 when Itaipu's first three turbines, of 700 megawatts each, go into operation. For 3 months, Itaipu's 2,100 megawatts will be "thrown out" because the transmission line will not be ready until 3 months after the plant goes into operation because of the 10 percent cut in the expenditures provided for the line project.

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BRIEFS

INCREASED URANIUM RESERVES--Brazilian uranium reserves increased from 266,300 to 301,409 tons, 192,540 tons of which are classified as measured and indicated, and 108,950 tons as inferred. This amount of uranium is enough to supply 30 nuclear reactors of the PWR type (light water and 3 percent enriched uranium) of 1.3 megawatts each for their whole useful life of 30 years. That information was covered yesterday to the Ministry of Mines and Energy by the Brazilian Nuclear Corporation (NUCLEBRAS). According to the ministry, the increase in Brazilian uranium reserves is due mainly to the work carried out in the uranium-bearing region of Lago Real, in Bahia, which increased from 63,000 to 93,190 tons, and to the increase in the total for the country's largest reserve, that of Itataia in Ceara, which went from 137.500 to 142,500 tons. The previous uranium reserves of 266,300 tons were announced last year and are included in "Plan 2000," a document prepared last March, which forecasts the generation and consumption of energy until the end of the century. The ministry announced also that this week NUCLEBRAS will become a member with voting rights of the Uranium Institute during the meeting of that international agency which is being held in London. [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 22 Aug 82 p 49] 8711

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RISING COSTS MAY END KALKAR FAST BREEDER PROJECT

Hamburg DER SPIEGEL in German 13 Sep 82 p 27

[Article: "Imminent End"]

[Text] Neither Bonn nor industry wants to continue to pay for the fast breeder. The costs are getting out of hand.

As late as February Research Minister Andreas von Buelow said that he does not believe in constantly discussing new prognoses for the fast breeder. Cost increases, according to von Buelow, can also be conjured up by talking about them.

In June he himself then talked about higher costs: The breeder would, after all, become more expensive than foreseen. "Heads must roll; the whole thing is a mess!" Chancellor Helmut Schmidt fumed.

Heads have not rolled. Meanwhile, von Buelow has also had to get used to the latest findings: Another financial gap of about DM 1.5 billion has occurred for the Kalkar fast breeder, which is to guarantee better utilization of fissionable material.

The nuclear reactor will not cost DM 6.5 billion and not 5 billion, as the builder, the Fast Breeder Nuclear Power Corporation (SBK), insisted as late as last year.

The SBK people allocate DM 1.1 billion for "unavoidable" construction costs, 300 million as risk surcharge and another 100 million for interest payments.

This, however, caus-d the financing concept devised at the beginning of the year by the research minister to falter. The imminent end of the ambitious nuclear power project seems near.

For the second time in one year von Buelow is facing a financial debacle. In September 1981 the SBK people had surprised their chief funding source with the information that the fast breeder would not cost DM 3.9 billion, as they predicted as late as 1980, but about DM 5 billion. A halt to construction threatened even then, because the minister's funds were only sufficient for the original calculation.

After drawn-out negotiations Buelow in February finally persuaded the reluctant electricity supply companies (EVU) to contribute the missing 1.1 billion. However, they tied their consent to the condition, among others, that they would not have to make good their promise to pay until the total financing had been arranged. In addition, the coalition's parliamentary groups were to withdraw their reservations against a start-up.

At least the first condition has not been met. The enterprises thus do not have to feel bound by their agreement.

In order that construction on the breeder could continue, von Buelow--in anticipation of the EVU money--had initially advanced DM 500 million from his budget. If the power producers now will not pay the agreed-on 1.1 billion, the entire amount--even if construction is halted--will become the taxpayers' burden, Orders have already been placed for the money.

"The risk," Buelow's spokesman Harald Uhl admits, "is entirely on our side."

The decision as to whether and how the EVU are to make their contribution to the energy-political prestige project must be made by the end of October, because that is when the cabinet will decide whether or not the breeder is to be completed. Even if the power producers arrive at a favorable result--their money is wholly included in the 1983 budget proposal--it is now completely open to question how Buelow is to plug the additional billion-DM hole.

For the power producers do not want to pay any more than the presently agreed-on DM 1.1 billion. Buelow believes that he could expect at most another 100 to 150 million.

Furthermore, the coalition parliamentarians are slowly beginning to realize that no one can be convinced with the argument of cheap nuclear power, when the price of power is already going to be noticeably raised, as the electricity producers intend to do, in order to finance only one reactor. Even among breeder fans, in the opinion of SPD-delegate Wolf-Michael Catenhusen, the tendency is growing for conducting the Bundestag debate on the safety of the breeder scheduled for the end of October "not entirely detached from the aspect of financing."

The discussion of cost comes just at the right time for breeder opponents in the SPD and FDP. Thier hope is that the project could still be brought down by this issue. They scarcely expect any help with their arguments from the Nuclear Energy Inquiry Commission established by the Bundestag.

The commission deals exclusively with the safety aspect of the reactor. But when the members vote on 24 September they must base their opinions on highly confusing material.

The commission had charged nuclear proponents as well as opponents with the task of studying in detail whether the breeder is more dangerous than conventional light water reactors. However, instead of a joint report the two groups of scientists only reached two opposite conclusions.

As expected the proponents evaluate the risks of the breeder as lower than those of the light water reactors. According to the calculations of the critics, however, the new type of reactor poses a risk greater by a factor of 20--measured in potential accident results.

"The attempt to deliver a scientific foundation which can later be implemented has failed," the chairman of the commission Harald Schaefer admits. The commission, which in any case is largely filled with nuclear energy proponents, is now likely to vote in favor of the breeder but at the same time to request additional safety regulations.

This throws everything wide open once again, however. The breeder could begin operation at some time, to be sure, but the additional regulations, as the Research Ministry has already calculated, would increase the financial gap from 1.5 to 2 billion.

"As for the future of the fast breeder," Research Minister von Buelow says resignedly, "I am prepared for all eventualities."

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FEDERAL REPUBLIC OF GERMANY

OVERVIEW OF NUCLEAR, ENERGY POLICY DEVELOPMENTS

Duesseldorf ATOMWIRTSCHAFT/ATOMTECHNIK in German Aug/Sep 82 pp 448-452

[Article by H. Gassert, chairman of the managing board of Brown, Boveri & Cie. AG, Mannheim, P.O. Box 351, 6800 Mannheim 1; revised version of the plenary-session paper read at the annual conference on nuclear engineering of the Deutsches Atomforum and the Nuclear Engineering Association, held on 4-6 May 1982 in Mannheim]

[Text] For some years now, the expansion in the use of nuclear energy and the further development of nuclear engineering have been found in a paradoxical situation in the FRG: The great importance of this source of energy is sworn to in political and economic quarters, and the speedy expansion of nuclear power is made out to be indispensable to the general economy and energy economy. However, in practice industry and the electricity sector find themselves faced with unending obstacles and quarrels which in their absolute single-mindedness are beginning to cast doubt on the advantages of nuclear power, at least in our country.

1. Scene Shifting

In a time when scarcely a day goes by without the issue of nuclear power plants and waste disposal being treated, and obviously needing to be treated, unfortunately, in some way or other in the press, a site determination causes a great deal of trouble. Subdued optimism that the breakthrough would now succeed before long--namely that the realization was growing about how practical and necessary nuclear energy is--still is accompanied by political temporization. Thus the debate goes on.

Just recently, coal-fired power plants have come into the field of fire again also, since their sulfur-dioxide emissions are supposed to be responsible for acid rain, acid soil, and thus for the dying away of the forests. At least nuclear power plants are not the cause of that. What is meant by "scene shifting" becomes clear by reference to an article headline in DIE WELT of 15 April 1982, which reads: "Nuclear Energy as the Last Resort of the Environmentalists?"

Obviously that which the much-maligned and so-called "nuclear-power lobby" has predicted as a warning for years is beginning to have an effect on energy policy:

- Electricity-generation costs are beginning now to increase appreciably for the private citizen, and for certain basic industries they are already too high--that is, they are destroying competitiveness.

- The excessively high technical requirements placed on nuclear power plants, with the thereby resulting costs and long construction times, are beginning to cause financing problems for the operators.

- The manufacturers are having a noticeably hard time not only continuing to hold available their capacities, but also maintaining an internationally competitive technology.

Now investment incentives are absent in truth, and instead of a certainly desirable cautious restructuring of German industry on a satisfactory general economic level, we have fallen into a deep trough of underemployment which is becoming increasingly more difficult to get out of. On this point it must be clearly said that the smaller power-consumption growth rates are, after all, the result of energy conservation only to a relatively small extent. At least half of such smaller rates can be attributed to the business slowdown. Moreover, they are also the consequence of already completed restructurings in industry.

Finally, in our striven-for "cordon sanitaire nucleaire" we have fallen into a true catch-22 situation with respect to economic efficiency, safety, and environmental protection:

- The fact that in the East nuclear power plants are regarded as indispensable and therefore are being built with nonchalance has been taken cognizance of in this country always in terms of ideological "judgments" only.

- The fact that our large neighbor in the West is building nuclear power plants in a way which systematically follows a clear economic-policy plan could someday bring us economic realizations which really were not wanted.

But much worse for us is the fact that our neighbors in the East and West are taking a chance on the supposed nuclear risks because they rate as even greater the risk of not having a reasonably-priced energy supply for their economies, in view also of possible sociopolitical problems. But since the geographic position of the FRG does not offer any great distances to the borders in the East and West, even at an imagined center, our safety with respect to nuclear power plants is the same as that of our neighbors, and with respect to fossil-fired power plants half of the immissions which come down in the FRG comes also from our neighbors. We hope that this observation is not construed as an argument against safety engineering and environmental protection, but rather is interpreted in terms of the necessity to point out time and again that we are not alone in the world and that in other countries as well, risks are not being trifled with.

Thus, if we carry on like we have been we will end up acquiring all the disadvantages of an economic nature, and we will then have to make do with the remaining advantages of a moral sort. It is doubtful whether our society will be content with that, or whether the consequences will still be so moral after all. I am sure that you recognize the concern which we must have and which finds expression in the bon mot: "It is not energy, but time, which is running out."

2. The Third Updating of the Energy Program

Every business--above all one run on such a long-term basis as the nuclear power plant business--needs some planning, a program. A state as well must have this. Therefore we were glad about the energy program of the Federal Government, and we are studying the Third Updating with great interest. This departs from the residual-need philosophy and once again assigns to nuclear energy a job of helping to meet our energy needs. Unfortunately, quantitative particulars are lacking in this updating which could make this a working program. In this respect, the Third Updating differs quite fundamentally from the nuclear-power program in France, for example.

According to the tenor of the Third Updating, nuclear power should find its place in the overall economy by way of the mechanisms of the market economy. In this respect a sound prescription, since in this way nothing economically foolish can happen by using it, in the short run at least. But on the other hand, for nuclear power plants in particular the State has at its disposal the entire arsenal of constructing requirements within the framework of the licensing procedure, and at any time it can thus curb or block the impellants which come from free-market decisions by the electricity sector.

Despite all the esteem expressed for the market as a regulating device, its effectiveness is still very limited when objectives in the national economic interest are also to be implemented more or less in parallel. In the case of nuclear energy, the following objectives are in competition:

- ability to accurately estimate capital expenditures,
- reasonably-priced energy for the consumer,
- a reliable energy supply to the consumer,
- minimal polluting of the environment,
- no endangering of the environment,
- reducing our dependence on imports.

Of course, these objectives are not harmonious. They must be harmonized along the lines of a balancing of advantages and disadvantages for the sake of the whole, and what is needed for that is a consensus of the sort so readily cited nowadays. Indisputably, in a democratically governed constitutional state consensus is a fundamental political duty. But, and it is becoming harder and harder for us to realize this, a consensus should also predominantly incorporate the interests of majorities, and moreover it needs also to be genuine. However, since the issue of nuclear energy has to do with a debate among representatives, the consensus we must come to, of course, is the one on the question "how do we want to live in the future?" And this is a sociopolitical question. But the opinion of the majority would be of significance here also. Anyway, back to our concrete problem.

At present, those political forces which via legislation eventually find their expression in licensing practice are turning nuclear power plants into a hazardous enterprise economically in many cases, for both the operators and the manufacturers, inasmuch as construction time and equipment--and consequently construction costs--cannot be predicted. Thus the goals are yet to be realized by means of wishful projections alone--see the Third Updating of the energy program. In looking for the quantitative aspect as the key and essential content of a program--how else could one compare the actual and the desirable condition--we find in the Third Updating the notion that in the year 1995 the FRG's energy supply should be covered in the following way:

- 1/3 by coal,
- 1/3 by oil, and
- 1/3 by other energies, including natural gas, water power, and Miscellaneous Energy Sources, as well as nuclear energy.

That is, understandably enough what is important above all is to reduce oil use from 44.5 percent (1981) to 33 percent (1995) (Figure 1). Can this objective be realized from today on, and what would this mean for nuclear power plant construction?

An estimate should show in what range must the share held by nuclear energy lie at the least in 1995, if the primary-energy demand is to be covered by means of the above-mentioned "three-way parity."

2.1. Zero Growth in the Energy Consumption?

If one assumes first that the appeal to a rational energy use leads to the situation that in 1995 the primary-energy demand is not higher than it was in 1981 (= 371 million tons of SKE [hard coal units]), then the second trend statement--that only 1/3 of the total primary-energy consumption is to be satisfied by oil--forces us to take measures to find substitutes for oil. And such substitutes for oil, which in 1981 had made a 45-percent contribution to meeting the primary-energy demand, will thus be on the order of magnitude of 12 percentage points of primary-energy consumption.

On the other hand, in 1981 hard coal with its 21 percent and brown coal with its 11 percent already made up roughly the fraction of 33 percent earmarked for coal, so the substitution of 12 percentage points in the case of oil can be done only by way of the other energy sources of natural gas, water power, Miscellaneous Energies, and nuclear energy.

In the case of natural gas, we just assume that it will be able to maintain in 1995 the same share of 16 percent of the primary-energy supply that it had in 1981, even though this is a question of an energy source, or sources, which can just as easily either dry up or bubble over, depending on political circumstances.

Because of the relations between geographic conditions and economic prerequisites in the FRG, water power cannot contribute substantially more than the share of 2 percent that it had in 1981 to meeting this demand. The Miscellaneous Energy Sources, which in 1981 made a contribution of 0.8 percent to the meeting of the demand, will be able to have a share in 1995 of about 2 percent--realistically seen--in the coverage of the demand for primary energy. Even this, with a growth of 1.2 percentage points, would already signify more than a doubling compared to the present contribution, and the technical and financial expenditure for this should not be overlooked. Of course, on this point it is possible to have a completely different opinion, and the possibility should not be ruled out that by the end of this century a few percentage points more may be realizable. But in principle this does not alter our above estimate, because the assumed zero growth of primary-energy consumption by 1995 is already a bold assumption.

Thus from the requirement that in 1995 oil should have a share of only about a third in the coverage of the primary-energy demand, we find a gap of about 13 percent. Nuclear energy has the capability of filling this gap, which relative to such energy is equivalent to about 29,300 MWe of nuclear power plant output. On the other hand, the nuclear power plants in operation at the end of 1981, with a total output of 10,400 MWe, had a 4.6 percent share in the coverage of the primary-energy demand, and so assuming zero growth for the primary-energy consumption we obtain altogether a nuclear power plant buildup output of about 19,000 MWe by 1995. This corresponds to a rate of increase of about 15 nuclear power plants of the 1,300-MWe class in a period of 13 years, or to 1.2 nuclear power plants per year.

Whether the authors of the Third Updating saw that their trisection assumption means a pronounced involvement on the part of nuclear energy in meeting demand--for example, in connection with space heating and transport--is not obvious from the text. In France, this is clearly the way being taken to reduce oil consumption.

2.2. Growth in the Consumption of Primary Energy?

A moderate growth in the primary-energy demand of 1.5 percent annually is equivalent, at a constant rate, to an overall growth of 20 percent in the primary-energy demand from 1982-1995, and thus in 1995 it would merely lead to the primary-energy consumption of 445 million tons of SKE. In that case, the share going to nuclear energy is at least the same proportion as that which it must assume in its sector according to the foregoing derivation (13 percent). This corresponds to about 10 million tons of SKE and thus to 6,000 MWe of nuclear power plant output brought about by the growth in the primary-energy demand. Thus, together with the previously derived overall demand of 29,300 MWe of nuclear power plant output, we now have a demand of 35,300 MWe for 1995.

Furthermore it is well known that brown coal, for example, cannot take on the share which it is supposed to provide from an assumed growth of 20 percent--a share which comes to about 8 million tons of SKE. If one fills this gap through nuclear energy, the result is again about 4,900 MWe of nuclear power plant output, or 40,200 MWe altogether. This would require already an annual growth rate of two nuclear power plants per year up to 1995, and all this with an assumed growth in the consumption of primary energy of only 1.5 percent per year up to 1995 (Figure 2). Other scenarios arising from other growth rates in the primary-energy consumption or from considering the question of the shares the individual energy sources may have in meeting demand are not going to be treated here.

In summary, the attempt at a quantitative exegesis of the Third Updating of the energy program has the following appearance: Even after a consideration of all conservation possibilities and substitutions in the energy sector, the role assigned to nuclear energy in coming years will be significant in quantitative terms as well. The question is whether nuclear energy will be able to play this role at all, considering the present construction times and construction costs. In light of the "ritardando" which has been going on for years now, an "accelerando" surely is not possible immediately. Precisely this is the big mistake made by the proponents of a moratorium, who probably think that one can drive forward and in reverse at will with the realization of such a sophisticated technology.

3. Measures

It is important that we succeed in again shortening the construction times and in lowering the costs. In no way whatsoever would this have a negative effect on the level of the safety engineering involved. On the contrary!! Because it turns out that with the presently common completion times of 11 years on the average for nuclear power plant projects, all of the decisions on those nuclear power plants which are to be on line by 1995 would have to be made in the next 2 years. These decisions pertain to a total capital expenditure which is calculated as follows: About 15 to 23 nuclear power plants, multiplied by DM 6 billion per nuclear power plant, = DM 90 to 140 billion. This is simply inconceivable from a business point of view. Therefore measures should be introduced for shortening the project execution times for nuclear power plants having 1,300-MWe pressurized-water reactors to between 6 and 7 years as measured from the receipt of the application up to commercial operation. From the manufacturer's side, this is realizable provided that during the project's execution the technical concept does not have to be continually subjected to a process of adjustment to the latest scientific and technological developments in each case.

Because of constraints present due to what has already been built, technical modifications of projects which are in the execution stage often lead to solutions different from what they would be if the goals pursued could have been incorporated in the plant's concept before the beginning of construction, with such "constrained solutions" often failing to be improvements. This means specifically that additional requirements on the plant engineering should be effected during the execution phase only when their improvement of the operational safety of the plant is a very substantial one.

Possible modifications which can be imagined from the constantly advancing level of science and technology either should be incorporated in new projects before the beginning of construction, or else should be retrofitted after the completion of the plant. The always exemplary technical level in German power-plant engineering generally--and in nuclear power plant engineering in particular--allows this manner of proceeding. This is borne out by the very degree of availability of the older nuclear power plant facilities. If this were done, it would also create the preconditions needed for separately identifying time-schedule and cost effects arising from subsequent requirements made. When the contractual basis is that of turnkey deliveries, projects which allow additional costs to accrue on the order of DM 200 million just because of 1 year of delay in the time schedule for paying financing costs are no longer manageable in a business sense.

Added to this are the costs for the missed sales proceeds for base-load electricity during the period of delay, as well as the costs which arise because of a multiplication of engineering work and finally because of increased deliveries and services in connection with the fabrication of the components, their installation, and the initial operation. Here, of course, a question arises about the reasons for the additional costs in connection with the currently practiced way of executing projects--the continual incorporation of technical modifications. Whereas the financing costs and the lost sales proceeds are relatively easy to demonstrate, difficulties arise in connection with the engineering-work expense. It is just the technically less costly solution which requires more engineering hours to work out how to get by with the lowest possible subsequent costs in connection with the hardware, installation, and operation. But it is difficult to demonstrate this conclusively, since for scheduling and cost reasons no engineer--or the company which employs him--follows up on the less suitable plan for a solution, merely in order to furnish proof of the reasonableness of the engineering-work expense. This state of affairs applies to precisely those plants which were ordered built some time around 1973, following the building of the first large plant of the 1,300-MWe output class, in the hope that the level of technology realized with this plant could be repeated in subsequent plants upon making the appropriate adaptations.

The conseqeunces of often apparently harmless rules in regulation manuals, guidelines, and standards, which then are reflected as state of the art in the requirements of the partial construction permits, often lead to unpleasant surprises in connection with projects in the process of execution. A technical concept, which surely has to have formed the basis of every nuclear power plant at the beginning, can stand only a limited number of modifications. When this limit is exceeded, there is a danger that the quality of the conception will suffer. In practice, one knows quite well what it means when a technically sophisticated construction no longer comes "from a single mold." Through too many modifications, experimental data are lost as well. The very necessity brought about by frequent modifications to keep track of the consistency of all data in the documents on licensing, construction and fabrication, installation, initial startup, and quality control has become a logistic and organizational problem, given the multilayered structure of licensing procedures--with such a problem being unforeseeable by anybody as late as in 1977. Added to this is the fact that the inherent momentum to make modifications which is assailing this plant engineering is happening against the background of judicial reviews before the administrative courts, which brings additional risks for licensee and manufacturer.

These remarks are not meant to question either the requisite certainty of the law or technical safety. On the contrary, in essence we can be proud of both. However, they are meant to show that the overlapping of various factors--the turnkey executing of a major project, consideration given to the latest level of science and technology, formal legal regulations, as well as those legal concepts which often cannot be interpreted in a fundamental way until in their application--becomes a task which is no longer executable on business grounds. And this is only because in the individual sectors maximum demands are made at all times, without heed being paid to an overall optimization. This is reflected even in technically perfected pressurized-water reactor projects, in terms of immense cost-overrun packages and time-schedule delays, which approach the limits of what is acceptable for gainful activity, not only from a management but also from a human point of view. Moreover, in connection with the prototype plants SNR-300 and THTR-300, we are demonstrating through the present course of action that this is reaching the limits of the amount of stress our economy can endure.

All of this is taking place in our country against the background of the increasing scarcity of fossil raw materials, the unavoidably increasing consumption of oil in the developing countries, and the recognized excessive dependence of our national economy on the imported energies oil and gas. On the other hand, for nuclear energy the relevant technical safety, the certainty of a supply, and its reduced polluting of the environment would seem to be sufficiently demonstrated.

If as is argued in the energy program of the Federal Government nuclear power is necessary to meet our future needs, then it is also imperative to create whatever conditions are indispensable in this country for enabling us to build as quickly as possible the requisite number of nuclear power plants, in line with not only management considerations but also those of the economy as a whole. But to that end, what is needed is not only the basic acknowledgment of "yes to nuclear energy." But also a consistent course must be set extending down to the administrative sector. In the sector of project appraisal, the consultants do not need to compete among themselves, but need instead to cooperate on matters of an essential nature, and among the operators of the plants what is needed is a readiness to adopt standardization for the industry without sacrifice of technical diversification.

However, without a clear political resolve we will not make any decisive advances in the future either. Given a clear political resolve, it is possible to find well-balanced relations for a constructive appraisal, for the administrative implementation, a standardization based on experience, and an appropriate judicial reviewability, such as to ensure that the result will be a technical and economic success.

4. Consequences?

German nuclear power plant engineering still sets an example worldwide, but already its competitiveness can be disputed. Not only is this true in relation to competition from other countries, but also it holds in relation to conventional energy sources. Any policy which would make it seem that nuclear energy was economically unnecessary in Germany because of the exaggerated demands placed on it would be a policy which would oust the FRG from its role as one of the leading industrial nations in general--and as a supplier of nuclear power plants on the international market in particular. With that, our social and economic capabilities would be called into question as well. We would surrender the quite major innovations of our generation.

With reference to the advanced reactor systems being pursued in the FRG, the consequences which a hesitant attitude can have become clear especially in light of the project for the fast breeder reactor in Kalkar. Whereas in this field the initial positions between Germany and France had been the same originally, today it can be stated that an initial sodium-cooled fast breeder plant with

1,200 MWe of output will go into operation in France in 1984, whereas in the FRG one should not anticipate any construction decision (!) for a comparable plant until toward the end of the 1990's. This is a trailing behind by the FRG of more than 10 years, following the same original starting position.

Meanwhile, the Inquiry Commission--which was appointed by the Ninth German Bundestag and which is supposed to work out a recommendation on the question of the initial startup of the SNR-300--is occupying itself with formal questions of whether the so-called "critical scientists" who are sitting on this commission can be granted a new extension of time to present their position. What is difficult to comprehend here are the declarations of policy understandings, which lead to new extensions of time and thus again endanger the arduously fabricated financing plan for the SNR-300.

In a similar way, with the high-temperature reactor there is a danger that the technical lead which we still enjoy worldwide in the utilization of high coolant temperatures is being gambled away, because due to the constant incorporation of subsequent requirements in the course of the present licensing procedure and the still pending licenses, the commissioning of the plant THTR-300 is being delayed until October 1985. With that, once again there is a threat that our advantage may be jeopardized in connection with a reactor line which should be made available as soon as possible for the realization of the projected goals of the Third Updating of the energy program--namely, energy conservation and substitutes for oil--in particular because of the favorable potentialities of this line for providing process heat. Therefore, should we not do our utmost to avoid additional requirements which are non-specific as to type in connection with the prototype plants, so as to cut down on costs by means of shortened project durations--seeing that in the case of the THTR-300 almost two thirds of these costs are generated as financing costs due to sliding prices? We really must come to realize someday how much innovative power was blocked when we come to pass in review these two prototype projects, in an area where after all we certainly do not have any superabundance of innovations to spare.

5. The Next Step

However, the crucial future step for the utilization of nuclear power in our country is to complete the fuel cycles. But in this connection one should not forget that what we have here is not a technical but a "homegrown" problem, at least as far as setting time limits is concerned. On this score, the hearing on the integrated waste-disposal center at Gorleben held in the spring of 1979 has led to the perhaps too well-defined statement of the case that indeed reprocessing "has been technically solved--but politically it is not acceptable at present." Certainly it cannot be denied that there have been many politically bold attempts to solve the problem, but on the party-politics calendar for the year--in 1982 above all--the urgency of this problem gets somewhat lost, of course. Since the boundary conditions are being politically formulated, the solution to the problem must be politically achieved as well.

Now the side responsible for plant engineering has indicated an intermediate-term alternative which involves the enlargement of the storage capacities for spent fuel assemblies at reactors, as well as a storage plan involving fuel-transport casks. Moreover, these solutions, drawn up in a short time and extending as far as documents ready to be executed, have made it possible to engage in replanning on the basis of a reprocessing concept which is no longer integreated with ultimate storage and which involves an annual throughput of 350 tons of heavy metal (HM). But since an unambiguously clear statement is lacking in the Third Updating of the energy program on the question of how much nuclear energy is needed by 1995, a debate on principles arises with practically every site discussion on a reprocessing plant of 350 tons of HM throughput. Moreover, again and again the matter at issue is whether perhaps such a facility might be superfluous after all if we would just effect an even greater utilization of coal, an even greater energy conservation, and a greater utilization of regenerative energy sources.

It is precisely in such situations that the lack of any unambiguous overall projections makes its appearance. Thus it is almost inevitable that with each site considered for a reprocessing facility, for a new nuclear power plant, or as in the Wyhl case even for a nuclear power plant duly licensed according to the regulations, the time-consuming debate on principles concerning nuclear energy must be held anew. Although all the decision-makers acknowledge the absolute necessity of nuclear power, they are setting up delays in advance through tactical and procrastinating intercessions, and thus they are adding to the cost of the capital expenditure needed for an assured energy supply, whether this is by way of too much of a dependence on the fossil energy sources, or whether it is by way of higher costs for the entire nuclear infrastructure. At the same time, what happens is that our technical lead in nuclear technology--and here quite specifically high-temperature reactor technology--is being lost as an exportable commodity.

Of what use is a public, affirmative statement on the applications for constructing the nuclear power plant units of Emsland, Biblis-C, and Isar-II, if at the same time a decree on the interpretation of Paragraph 28 of the radiation-protection regulation again checks the hoped-for stimulus? Small wonder that the prospective operators of such plants are asking themselves the question of whether it is still economically justifiable to acquire such licenses.

6. General Considerations

So, given that it is not disputed by the majority that nuclear power has an important--that is, more than a marginal--function in our country's energy supply, then one should create the preconditions needed for nuclear power plants to be efficiently built, so that nuclear power as well is made available at a reasonable price. However, what is needed for that first of all is an understanding of certain fundamental connections, and furthermore a consensus concerning the aim to be striven for. Such a fundamental connection is the one between an assured and economical energy supply on the one hand, and public security, full employment, and a high standard of living on the other. Of course, nowadays cause and effect tend to be mixed up arbitrarily, which has been demonstrated already with the example of growth rates for electricity consumption. Since the economic and energy policy are to be planned for the long term, it is completely wrong of course to pick the present situation as a standard for the future. It is precisely the present unsatisfactory, truly alarming circumstances that we want to end, after all! Thus, the only question remaining is: Who is going to begin, and with what? The calculation showing what employment effects are caused by the construction of a nuclear power plant or of a reprocessing plant has been made repeatedly, and the figures are reliable and sufficiently well-known. If we begin with a speedy buildup of nuclear power plants, we cannot go wrong! But the tenor here lies on speed!

In past years, manufacturers and operators have gone through practically a technical, administrative, and judicial purgatory, in which even their innermost weak points were burned out and in which admittedly also nasty burns were produced. All who mean well should be so purified by now that we can return again to simplified procedures, to simple and for that very reason reliable technical concepts, and--more specifically--to documentations which are technically practical. Granted that the principle is valid that technical solutions and especially modifications should be judicially reviewable through administrative courts, then for all parties concerned technical clarity is an immense advantage. Moreover, in the area of engineering this involves also the admission that soundly-based experience is better than an untested theory. Moreover this also requires that we divest the handy saying "safety before economy" of its converse conclusion, that economy in some way signifies planned insecurity.

The vehement quarrel concerning the peaceful use of nuclear power evidently has forced all parties into positions which enormously obstruct the repeatedly invoked consensus. However, if we disregard those who have an eye to quite other aims than the welfare of our society, we can find signs that we are much nearer a consensus than the scene suggests. Perhaps we are only seeking a way to manifest this consensus. To that end what is needed is an unflagging continuation of the dialogue, especially with the young generation. This dialogue must have the whole as its subject--which in essence means: One should show connections between public security and an assured energy supply, between educational policy and economic policy, between environmental protection and capabilities, just to mention only a few such connections. From its import, this means also to promote an understanding of the connection between readiness to take risks and security for the future. But in addition to all the material measures needed, for which incidentally one must have come by the money first, this security for the future requires also an increased personal social commitment, a step taken towards an active sense of community. Finally, however, this requires also courage, courage to make decisions. And as a matter of fact in the domain of politics we see heartening examples of this again and again, but certainly not often enough. And it would be desirable if the media, which after all gain to the highest degree by technical progress and by an assured electricity supply, would embrace this cause more energetically.

Let us bring to bear our often painfully acquired experiences from the past and exert ourselves for the good of our society and social order. To that end, we still have to find a consensus for the peaceful use of nuclear energy to the requisite extent. Let us be optimistic, even though time is pressing. But if this consensus fails to materialize, the shifting scene referred to at the beginning may soon turn into a tribunal sitting in judgment on our society.

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2 November 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 168

JOINT PUBLICATIONS RESEARCH SERVICE
25
ANNIVERSARY

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2 November 1982

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 168

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ALP SOCIALIST-LEFT FACTION REOPENS NUCLEAR POLICY DEBATE

Canberra THE AUSTRALIAN in English 30 Aug 82 p 1

[Article by David Wilson]

[Text] THE Victorian Labor Party will hold a special conference to debate the Federal ALP's uranium policy.

The conference will be held on October 3 and is expected to attract a "full house" of delegates.

The party's administrative received a petition from more than 60 State conference delegates at its meeting on Friday night.

The petition called for a special State conference to discuss the issue.

It followed a recent meeting of more than 400 ALP members who voiced strong opposition to the uranium policy adopted by the Federal ALP at its national conference last month.

The new uranium policy allows for a Labor government to "phase out" the uranium industry but removes the obligation to immediately repudiate existing uranium contracts.

The State secretary of the Victorian ALP, Mr Bob Hogg, a member of the party's Socialist-Left faction, moved the modification in the ALP's previously uncompromising attitude to the export and mining of uranium.

Shortly after the national conference Mr Hogg was excluded from the Socialist-Left faction and a bitterness has emerged within the group over the uranium issue's treatment at the national conference.

Mr Hogg said last night that he opposed a special conference

He said that he believed the issue should be debated three weeks later at the party's scheduled State conference.

He said the special conference would seek a review of the ALP's uranium policy and a special national conference to examine the policy.

The decision to hold a special conference is certain to give the Prime Minister, Mr Fraser, more ammunition with which to attack the Cain Labor Government.

Moderates within the Labor Party claimed that the special conference would be interpreted as a victory for the Socialist-Left faction even though opposition to the mining and export of uranium had a strong following within all factions of the party.

CSO: 5100/7501

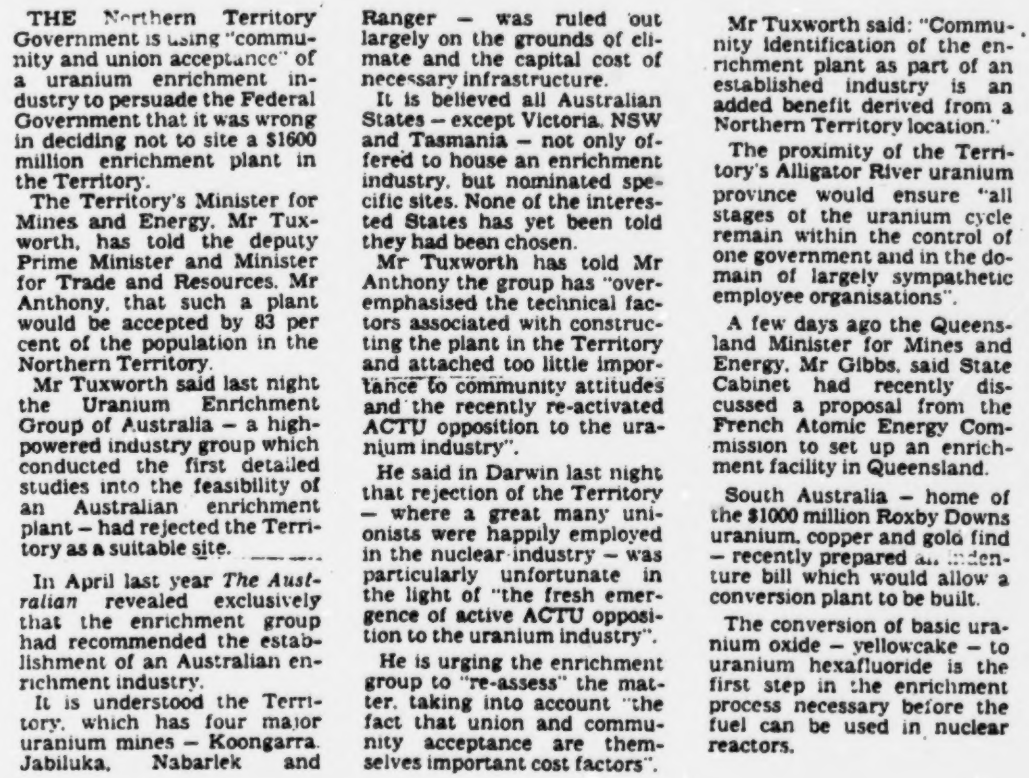
AUSTRALIA

NORTHERN TERRITORY BATTLES FOR URANIUM ENRICHMENT PLANT

Canberra THE AUSTRALIAN in English 30 Aug 82 p 3

[Article by Errol Simper]

[Text]



THE Northern Territory Government is using "community and union acceptance" of a uranium enrichment industry to persuade the Federal Government that it was wrong in deciding not to site a $1600 million enrichment plant in the Territory.

The Territory's Minister for Mines and Energy, Mr Tuxworth, has told the deputy Prime Minister and Minister for Trade and Resources, Mr Anthony, that such a plant would be accepted by 83 per cent of the population in the Northern Territory.

Mr Tuxworth said last night the Uranium Enrichment Group of Australia – a high-powered industry group which conducted the first detailed studies into the feasibility of an Australian enrichment plant – had rejected the Territory as a suitable site.

In April last year *The Australian* revealed exclusively that the enrichment group had recommended the establishment of an Australian enrichment industry.

It is understood the Territory, which has four major uranium mines – Koongarra, Jabiluka, Nabarlek and Ranger – was ruled out largely on the grounds of climate and the capital cost of necessary infrastructure.

It is believed all Australian States – except Victoria, NSW and Tasmania – not only offered to house an enrichment industry, but nominated specific sites. None of the interested States has yet been told they had been chosen.

Mr Tuxworth has told Mr Anthony the group has "overemphasised the technical factors associated with constructing the plant in the Territory and attached too little importance to community attitudes and the recently re-activated ACTU opposition to the uranium industry".

He said in Darwin last night that rejection of the Territory – where a great many unionists were happily employed in the nuclear industry – was particularly unfortunate in the light of "the fresh emergence of active ACTU opposition to the uranium industry".

He is urging the enrichment group to "re-assess" the matter, taking into account "the fact that union and community acceptance are themselves important cost factors".

Mr Tuxworth said: "Community identification of the enrichment plant as part of an established industry is an added benefit derived from a Northern Territory location."

The proximity of the Territory's Alligator River uranium province would ensure "all stages of the uranium cycle remain within the control of one government and in the domain of largely sympathetic employee organisations".

A few days ago the Queensland Minister for Mines and Energy, Mr Gibbs, said State Cabinet had recently discussed a proposal from the French Atomic Energy Commission to set up an enrichment facility in Queensland.

South Australia – home of the $1000 million Roxby Downs uranium, copper and gold find – recently prepared an indenture bill which would allow a conversion plant to be built.

The conversion of basic uranium oxide – yellowcake – to uranium hexafluoride is the first step in the enrichment process necessary before the fuel can be used in nuclear reactors.

CSO: 5100/7501

DEVELOPMENT OF URANIUM ENRICHMENT UNDER STUDY

Canberra THE AUSTRALIAN in English 10 Sep 82 p 26

[Text] FOUR large resource development companies making up the Uranium Enrichment Group of Australia are studying the developing of a uranium enrichment plant in Australia with the blessing of the Federal Government.

CSR, BHP, Peko Wallsend and Western Mining Corp have invested $5 million in a feasibility study for the plant which would triple the export value of local yellowcake by purifying it to a suitable grade for commercial power generation.

At this stage UEGA appears likely to go for the gas centrifuge uranium enrichment process which was pioneered by Urenco-Centec, a Dutch, British and West German group of companies.

Urenco, with plants in Almelo in the Netherlands and Capenhurst in the UK, to be followed by a third in 1985 at Gronau in West Germany, is one of the front-runners in the Australian enrichment stakes.

Company officials in Almelo hope to welcome Australia as the fourth Urenco country by the middle of this decade, offering it access to its high technology through a partnership.

Urenco says it offers advantages in world markets.

Because its advanced gas centrifuge process requires very little energy, it is not only cheaper, but also offers a reasonable guarantee of long-term stability.

A Dutch scientist, Professor Kistemaker, is the brains behind the gas centrifuge system.

In the Urenco process, uranium in the form of gaseous uranium hexafluoride is fed into centrifuges which rotate at very high speed. The exact speed is a company secret, as are the height and diameter of the centrifuges.

Expansion

The heavier U238-bearing molecules drift to the outside wall while those containing U235 atoms accumulate nearer to the middle of each centrifuge.

The separation process is enhanced by inducing a gas circulation within the centrifuges, producing a concentration gradient along the length which allows enriched and depleted gas to be removed at opposite ends of the rotor.

A single centrifuge achieves only a small degree of enrichment, so many thousands of them are connected in cascades resembling automated milk factories, each producing uranium enriched to about 3 per cent.

The enriched uranium hexafluoride gas flows from one end of the cascade system and is cooled into transit containers for shipment to the fuel fabricator.

Urenco's centrifuge machines are designed to operate for more than 10 years without maintenance.

Urenco's expansion is nonspeculative. It has as its main foundation a requirement-orientated build-up program, matching the construction of enrichment capacity to actual demands secured by contracts.

This policy is possible because Urenco centrifuge plants can be constructed economically on a modular basis in small capacity steps and on a very short lead time.

One such module is capable of supplying the enrichmend for a nuclear power plant of 1300mW.

In spite of the substantial reduction in nuclear power plant construction since 1974, Urenco's growing order book has led to a steady expansion program.

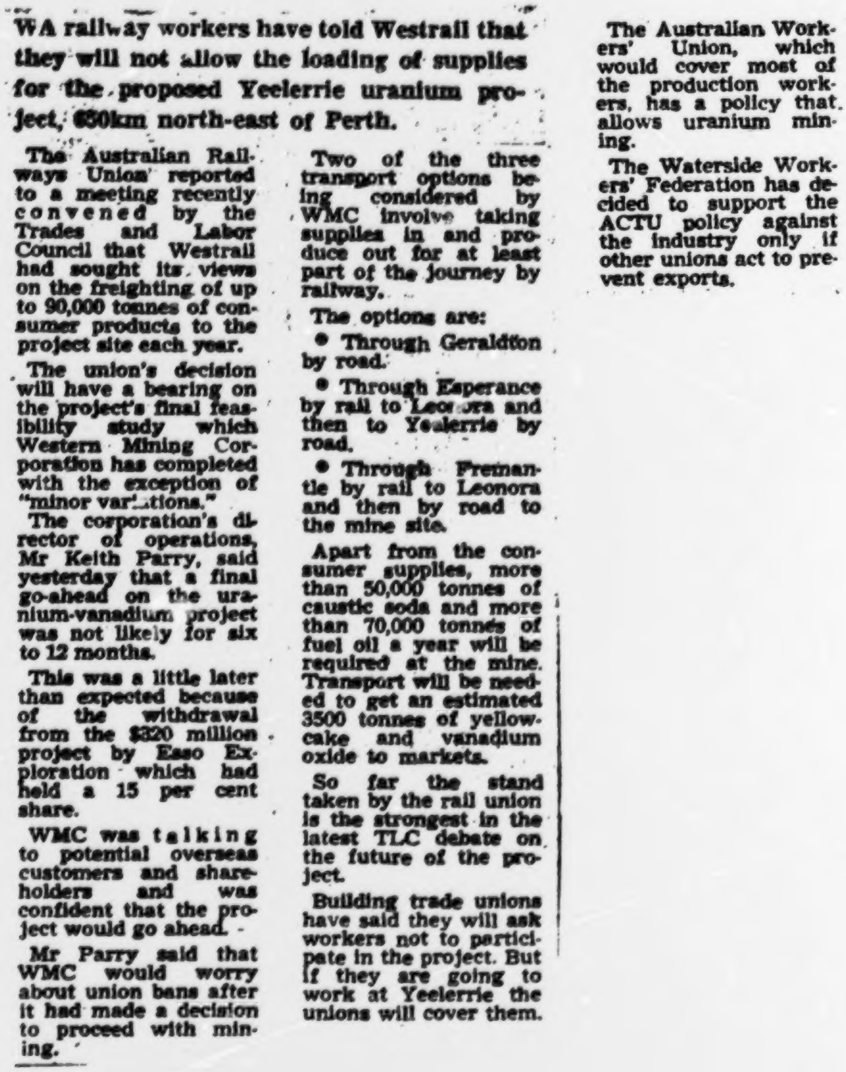
Total enrichment capacity in the Netherlands, Great Britain and West Germany will pass 2000 tonnes of separative work per annum by the mid 1980s and is expected to reach 5000 tonnes per annum by the mid 1990s.

CSO: 5100/7502

RAIL WORKERS WILL BAR SHIPMENTS TO URANIUM PROJECT

Perth THE WEST AUSTRALIAN in English 10 Sep 82 p 4

[Article by Paul McGeough]



[Text] **WA railway workers have told Westrail that they will not allow the loading of supplies for the proposed Yeelerrie uranium project, 650km north-east of Perth.**

The Australian Railways Union reported to a meeting recently convened by the Trades and Labor Council that Westrail had sought its views on the freighting of up to 90,000 tonnes of consumer products to the project site each year.

The union's decision will have a bearing on the project's final feasibility study which Western Mining Corporation has completed with the exception of "minor variations."

The corporation's director of operations, Mr Keith Parry, said yesterday that a final go-ahead on the uranium-vanadium project was not likely for six to 12 months.

This was a little later than expected because of the withdrawal from the $320 million project by Esso Exploration which had held a 15 per cent share.

WMC was talking to potential overseas customers and shareholders and was confident that the project would go ahead.

Mr Parry said that WMC would worry about union bans after it had made a decision to proceed with mining.

Two of the three transport options being considered by WMC involve taking supplies in and produce out for at least part of the journey by railway.

The options are:

- Through Geraldton by road.
- Through Esperance by rail to Leonora and then to Yeelerrie by road.
- Through Fremantle by rail to Leonora and then by road to the mine site.

Apart from the consumer supplies, more than 50,000 tonnes of caustic soda and more than 70,000 tonnes of fuel oil a year will be required at the mine. Transport will be needed to get an estimated 3500 tonnes of yellowcake and vanadium oxide to markets.

So far the stand taken by the rail union is the strongest in the latest TLC debate on the future of the project.

Building trade unions have said they will ask workers not to participate in the project. But if they are going to work at Yeelerrie the unions will cover them.

The Australian Workers' Union, which would cover most of the production workers, has a policy that allows uranium mining.

The Waterside Workers' Federation has decided to support the ACTU policy against the industry only if other unions act to prevent exports.

CSO: 5100/7502

ENERGY MINISTER'S SPEECH TO NUCLEAR SCIENCE INSTITUTE

Dacca THE BANGLADESH TIMES in English 4 Oct 82 pp 5, 7

[Excerpts from the speech of Air Vice Marshal Sultan Mahmud B.U., Deputy Chief Martial Law Administrator and Minister for Energy and Mineral Resources, delivered at the Institute of Nuclear Science and Technology, Atomic Energy Research Establishment at Savar, Dacca, of Bangladesh Atomic Energy commission]

[Text]

I must first thank you and the community of Atomic Energy Commission for affording me the opportunity to be with you, and if you will permit the indulgence, be a part of you, and thank the distinguished guests to be with us this morning at the premises of the research establishment of the Atomic Energy Commission, to perhaps what I would like to say, some transactions of opinion on the Energy Prospects and the Role of Atomic Energy in Bangladesh", which I hope and pray will sufficiently energize the minds of some of us. whom I fear are becoming vulnerable to institutional inertia.

Whatever the aspects of our policy, the need for new departures is apparent. The issues which have gone unresolved for a decade, no longer permit delay. At every turn, we confront directly and urgently to choose between necessities. It is futile now to debate the causes of this state of affairs. However, nor has this period, if I may reassure you, been without significant achievements.

No country can live in total isolation.

As such, your performances will be measured against relative standards. And it may not appear well. So, your possibility of an honourable survival and continuance as one of the most esteemed institutions of our country that can play an enormous role in almost all conceivable aspects of our life, has dangerously narrowed.

We can and we will shape our future. There is a little prerequisite, however, is that we give up our illusions. We are no longer invulnerable. The easy remedies have been thought of and probably are talked about in the cafes. We must be ready to face complexity. Above all, we must not delude ourselves about the gravity of our position.

You must be ready to stand alone and confront unresolved problems with Faith and Courage. In a world of today, this could hardly be otherwise. The only surmountable yardstick has to be your professional pride and dedication.

Allow me, without further preamble, to broach on the subject for which I have come to spend some-time with you on "Energy Prospects and Role of Atomic Energy in Bangladesh".

Looking at the international scene, it has become clear that the known reserve on non-renewable fuels like coal, oil and gas will not be adequate to meet the energy demand of the world for long Research and development activities are, therefore, conducted everywhere for utilizing new source of non-renewable and renewable energy. They include solar, geothermal wind, biomass, fuel-wood, charcoal, oilshale, tar sands, ocean, peat, etc.

The energy situation in Bangladesh is far from satisfactory. Considerable amount of our rural energy requirements are met by so-called traditional fuels like firewood animal waste, dry leaves, twigs, rice husks, jute-sticks etc. Many of these sources are rapidly dwindling and these sources are unable to cope up with the rising need of the increasing population. As a result, unhealthy deforestation leading to erosion and desertification is taking place. Such a process of ecological imbalance cannot be allowed to continue.

With the development of the country, the role of traditional fuel will be a diminishing one, since a major part of the demand increase, in future years will be for commercial types of fuel—a form of energy which enable a country to increase its GNP more efficiently than traditional forms of energy.

The total commercial energy resource of the country amounts to about 1670 million tons coal equivalent. The coal resource is estimated to be over thousand million tons. The deposit lies between 3 to 4 thousand feet below the alluvial soil and its exploration poses some technical problems. About 68 million tons coal equivalent of peat deposits occur in good rice growing areas which go under water during the monsoon season.

Of the limited hydropotential, Kaptai could ultimately produce about 230 MW and the Sangu river site can probably be harnessed for 90 MW Detailed feasibility work needs to be carried out about sites like Ganges or Brahmaputra barrages for deciding their potential.

Our most important commercial energy resource is natural gas, Of which, we have a proven reserve of approximatety 11 trillion cubic feet. It is obvious that we have to rely heavily on this resource to meet our energy needs. However, the inadequacy of the gas resources will be clear from the fact that if Bangladesh tries to achieve the very modest target of per capita commercial energy consumption of 200 kg coal equivalent by 2000 A.D. (present consumption being about 45 kg coal equivalent per head) mainly through use of natural gas and hold the consumption level constant thereafter, then the present gas resources will be exhausted in about thirty years.

I should, however, like to make it clear that there is much of our land, yet to be explored. Bangladesh is a highly prospective area for accumulation of hydrocarbons. We have so far discovered gas, mainly in the eastern zone. Search for oil and gas in the past was done by commercial oil companies who concentrated on the eastern zone after the initial discovery in this region. Western zone has also prospective structures in the vicinity of Bagerhat, Chalna and Kutchma in Bogra, what is mostly known as the Hinge-zone.

Oil has so far not been discovered. It is expected from the geological structure of our land that oil may be found at deeper level than the presently discovered gas-bearing zones. Drilling at such depth requires caution, high engineering skill and higher quantum of investment. While our engineers are conversant with technology of shallow-depth drilling, acquiring knowledge for deep drilling has only started. We are, indeed, hopeful of finding, oil, once deep drilling at prospective zones can be undertaken in statistically significant numbers. In this regard, some offshore areas of Bangladesh which is an extension of the on-shore gas-bearing structures, have also good prospects. As you know, six oil companies had in the recent past done exploration, including drilling in these areas and gas was found in Kutubdia in commercial quantities. Analysis of data from these surveys is likely to pinpoint locations for more intensive search.

Exploration for uranium and thorium resources are also going on in the country. Radiometric anomalies have been discovered in some areas of Sylhet, Chittagong and Chittagong Hill Tracts. Beach Sands at Cox's Bazar have shown deposits of heavy minerals which can be commercially exploited.

In view of our limited fossil fuel resources, Bangladesh, as you know, has been trying for a long time to install its first nuclear power plant. The necessity of nuclear power plant in this country has been established through a number of feasibility studies in which the International Atomic Energy Agency (IAEA) rendered valuable assistance. Unfortunately, our efforts have not been successful so far, mainly because of lack of required finance. It may be mentioned in this connection that in the IAEA review report on selection of a reactor for the Rooppur Nuclear Power Project of Bangladesh prepared in May 1982, it was mentioned that an "International Demonstration Reactor with a special warranty of the supplier and wide distribution of risk could possibly represent a novel approach towards the solution of the problem".

It was suggested by us in the last meeting of the Board of Governors of the IAEA that a demonstration reactor of 300 MWe could be constructed in a developing country as a joint venture of the country supplying the reactor, the IAEA and the recipient country. We have also offered the necessary site, manpower and infrastructure, as far as available in Bangladesh, for the proposed demonstration reactor. I hope that the IAEA will initiate such a programme and help secure the necessary finance. I am hopeful that friendly developed countries and other international organisations will cooperate with IAEA in implementing this idea. The benefit of experience of such a project can flow to other developing countries.

A large fraction of our hard earned foreign exchange is spent to pay the bills of fuel import. I feel, and I am sure, you do too that there is great need, as well as scope, for exploring alternative sources of energy, maximising and diversifying uses of indigenous resources, substituting high cost fuels as far as practicable, minimising deforestation etc. In order to study these problems and the ones associated with assessment of requirements, survey of resources, efficient production and utilization of energy, efforts in different disciplines are necessary.

Atomic Energy Research Establishment is a multidisciplinary research centre with supporting facilities like computer, workshop, electronics laboratory, engineering laboratory, etc. It can possibly offer a good venue for activities in these vital areas of national development. Research works in the energy field are now being carried out in an uncoordinated manner in different laboratories of the country. Establishment of an Institute of Energy in this campus for planning, coordinating and executing research projects on the subject will be given due consideration.

I would now like to turn to the research activities of the Bangladesh Atomic Energy Commission which is now engaged in the peaceful application of atomic energy in the fields of agriculture, medicine industry, electronics and other areas of interest to the nation.

Talking of agriculture, the atomic energy programme includes works on improvement of the variety of food and cash crops, determine methods for optimum use of fertilizer, finding the extent of micro-nutrients in the soil and efficient use of water with isotope techniques. The Institute of Nuclear Agriculture was awarded the President's Gold Medal in 1981, for which, though belated, I would like to congratulate the Scientists concerned. Its present transfer to the Ministry of Agriculture to form a coherent research programme, along with other Agricultural Research Institutes of the country, is also a measure of its success.

In the field of medicine, the Atomic Energy Commission has set up Nuclear Medical Centres in Dacca, Chittagong Rajshahi and Sylhet. Further expansion of the programme throughout the country is envisaged and I hope that the benefit of nuclear medicine can reach the door-steps of common man.

I understand that the biological scientists of the Atomic Energy Commission have successfully carried out studies in radiation biology resulting in methods of preservation of food and sterilisation of medical instruments. Pilot scale operation is in progress to determine the commercial viability of the preservation of perishable food and vegetables like potatoes and onions as well as fresh and dried fish I can see that this programme has a large potential in reducing wastage in agricultural production. The research workers and industrial enterpreneurs should now get together for large-scale application of the method.

One of the most important pieces of work in which BAEC scinetists are engaged is in the field of health physics and environmental monitoring. In fact it is for this activity that nuclear regulatory bodies like BAEC are essential and the Government is soon going to introduce necessary legislative measures for radiation protection and nuclear safety. In the meantime, the radiation levels of X-ray installations of the country and radioactivity present in the environment are being constantly monitored.

With the industrialisation of the country, the question of quality of production will become increasingly important and nuclear techniques can be applied in quality control methods. At present gamma radiography techniques are being used to test the weld quality of pipeline joints, pressure vessels, boilers, etc. and soon activities in industrial radiography will extend to quality control of products with the help of newer radioisotopes and radiation sources.

I am happy that the Bangladesh Atomic Energy Commission is now entering the second phase of its programme by establishing modern scientific laboratories in the Savar Establishment. The principal facility is going to be a research reactor. The installation and operation of the reactor will undoubtedly be a technological achievement. Radioisotopes will be produced at home and research and development work can be conducted in physical biological and engineering sciences. I am sure that the reactor installation work will proceed as scheduled.

I have observed some research and development in this premises in the field of electronics. Scientists have to go a long way to achieve the target. Your primary task should be to recruit and train necessary skilled manpower. Next comes selection of problems of interest to the institution and the country, and carrying out R&D work before entering production phase. There is a storehouse of available knowledge in this field and advantage should be taken of this first.

The Atomic Energy Commission did some pioneering work in the introduction of computer science in the country and I am glad that they are now in the process of setting up a computer of the 4th generation in this campus This will add to the existing facilities in the country in fulfilling the computational requirements or in scientific, commercial, technical and business data processing.

One of the important by-products of Atomic Energy Programme is the development of new technologies and building up of infrastructure for research and development. The Savar Establishment, when completed, will not only fulfil the requirement of the scientists to carry out advanced work in atomic energy and related fields but new areas of research and investigation work will emanate from here. Space Science has already found an important place in our applied programmes. We should now look towards the ocean and probe its depth for the vast resources that exist in the Bay of Bengal. Our water is equal the size of our land. Other Institutes of advanced research, especially those needed to explore our resources, monitor the environment and improve production, could be set up to take advantage of the scientific infrastructure being built here.

No nation can prosper and be self-reliant without the application of Science & Technology. Atomic Energy programmes, being multidisciplinary and sometime inter-disciplinary in nature, could lay the foundation of such a base of science & technology. I shall be happy to see colse cooperation amongst the scientists of various disciplines not only inside this campus, but a growing interaction between different research and educational institutions. Modern research involves team work in over-lapping areas as well as disciplines, to produce timely and desired results. I am sure scientists will live up to our expectations.

The Government has clearly and unequivocally expressed its commitment to the peaceful uses of nuclear energy by becoming a party to the Nuclear Non-proliferation Treaty (NPT) and by signing the Safeguards Agreement with the International Atomic Energy Agency (IAEA). Bilateral agreement on peaceful uses of Atomic Energy has also been made with the United States and France. I am sure, our friends will assist us in our efforts to use peaceful atom for national progress. IAEA has been helping Bangladesh in many ways, especially in training of manpower. I am hopeful that other international agencies will also join in this area of activity.

Here, as I come to a closure of my views, I would like to sound a note of warning to those who are apt to use the word, Technology Transfer. Technology is and has to be acquired. Much that you may desire, your accomplishments to be admired by our countrymen. You have yet not been able to succeed in making either your values or credibility be equal to their hopes and aspirations. So, you shall have to confront the unresolved problems and improvise a response under pressure of events. Therefore, your attitudes cannot remain passive. History assures a guarantee of eventual success.

Creativity, innovations, sacrifice pale before trifle considerations of day to day concerns. Our generation will live in the midst of change. The success of your actions will be falsely measured by your short-term gains. It will probably be only defined by whether we can shape the currents of our time in the light of our values. You are a community of professionals, who are unlikely to be rewarded immediately on your accomplishments. And I would like to assure those who may seek assistance, of my concern and also the need for patience and dilligence to go through a painful period of construction.

Our ability to master the time will be a measure of our worthiness as an individual, institute and a nation.

CSO: 5100/7069

TEXT OF ENERGY MINISTER'S SPEECH AT IAEA MEET

Dacca THE NEW NATION in English 19 Sep 82 p 3

[Text] Following is the full text of the speech of Air Vice-Martial Sultan Mahmud, DCMLA and Minister for Energy and Mineral Resources, delivered at the IAEA Conference held in Vienna on 'Nuclear Power Experience' on Sept. 13 :

Mr. Chairman and distinguished delegates,

First of all I would like to express my gratitude to the Director-General of the International Atomic Energy Agency for affording me this opportunity to address such an august gathering. I indeed consider it an explicit privilege. I am sure your deliberations in this week will open new vistas in the field of nuclear power.

On the 25th year of founding of the IAEA, we note with happiness the contribution of the Agency in promoting peaceful uses of the atomic energy in field as diverse as agriculture, medicine, electronics, mineral survey and above all, nuclear power.

On a global basis, it is often said that sufficient commercial energy resources are available to last a few centuries. This, however, is of little consolation to the developing countries with scarce resources of their own.

THIRD WORLD

The early promise of nuclear power as a cheap and abundant source of energy has remained, more or less. unfulfilled as far as the Third World countries are concerned. The Agency had, since its inception, carried out a number of market surveys and nuclear power planning studies, for introduction of nuclear power in developing Member States.

IDR CONSTRUCTION

It had also convened a number of meetings of possible reactor suppliers and purchasers of Small and Medium-sized Power Reactors (SMPRs), which are suitable for the developing Member States. Unfortunately, in spite of considerable efforts of the Agency, if you permit my indulgence, nothing very tangible resulted from all these studies, meetings and panel discussions. Although there were reactor manufacturers willing to sell and developing Member States willing to buy, and cost of nuclaer power was found compititive even at small sizes compared to that from fossil fuel, the heavy initial capital could not be arranged for. In order to break the stalemate and generate confidence among the financial entrepreneurs, I would like to put forward, for consideration of this august gathering, a proposal for the construction of an International Demonstration Reactor (IDR) in the SMPR range in a developing Member State, to be sponsored by the Agency.

JOINT VENTURE

An IDR with special warranties of the supplier and with financial risks distributed widely among various parties could help both in demonstrating provenness as well in obtaining finance for such a plant. This could be a joint venture of the IAEA, the lending asencies, the country supplying the reactor and the recipient Member State. It should not be regarded as the Agency's entry into the commercial aspects of nuclear power. The Agency as a catalyst to demonstrate the viability of nuclear power in the SMPR range. It will also include issues like efficient management of nuclear power project, manpower developing etc. I would propose that the Agency convenes a meeting of international financing organisation like the World Bank, the Asian Development Bank, the OPEC Fund, the Saudi Fund for Development, the Kuwait Fund and other interested private financing agencies, as well as delegates from countries having interest in SMPR export, SMPR manufacturers and prospective SMPR buyers to consider the proposal of an IDR. The accomplishment of this proposal will generate the following benefits:

(a) The concept and economics of an IDR will be tested under the present day criteria and conditions prevailing in developing Member States :

(b) IAEA's role in acting as a catalyst for arranging finance for reactors in developing Member States will be tested and

(c) North-South dialogue on transfer of technology will be effectively implemented under the auspices of an international organization. Thus evolving mechnism for technology transfer in the nuclear field.

N-PLANT IN BANGLADESH

I would now like to draw your attention, Ladies and Gentlemen, to the feasibility of establishing a nuclar power station in the western zone of Bangladesh. We have few proven energy resources and have very little scope for hydro-power generation because of the terrain features of the country, as such, we are compelled to import at a prohibitive price, oil for electricity generation. It needs, I am sure, no greater emphasis for us to accede that increased use of energy is vital for the development of any country. This could be met, amongst other alternatives, by nuclear power. Need for unclear power in Bangladesh has been established through many feasibility studies carried out in the past. A site has been selected, acquired and cleared for constructions to begin, Survey of local capabilities in construction of a nuclear power station has been made Nuclear regulatory activities have been geared up. These will be discussed in detail by our representatives during the Technical Sessions of this Conference.

It is obvious that we lack the resources to finance the installation of a nuclear reactor. Nontheless. Bangldesh has gone a long way in the application of Atomic Energy in the field of Agriculture, Medicine Food, Preservation etc. I, on behalf of the Bangladesh Government, offer the site, manpower and other infrastructure facilities as far as available in Bangladesh for installing the IDR. Bangladesh is a developing Member State and a signatory to the NPT. I would further like to assure the Conference that if the IDR is built in Bangladesh. we would make such a facility available for on the-job training and dissemination of information to other Member States who many desire to have access to this facility.

PEACEFUL APPLICATION

I am indeed hopeful that this august gathering of most renowned intellectuals in the nuclear world, will consider ways and means of establishing nucalear power as a reliable and economic source of energy both for developed and developing countries to meet the future needs of energy. I firmly believe that the International Atomic Energy Agency, under the dynamic leadership of the Director General, will spearhead a new movement in the peaceful application of atomic energy. We would also like to seek the co-operation of nulear power nations through the IAEA in the development of nuclear power in Bangladesh,

CSO: 5100/7003

EDITORIAL LAUDS MAHMUD'S STAND AT LAEA MEET

Dacca THE NEW NATION in English 19 Sep 82 p 5

[Editorial]

ENERGY CRISIS

While addressing the international conference on nuclear power experience about the role of International Atomic Energy Agency (IAEA) in promoting nuclear power in developing countries at Vienna Deputy Chief Martial Law Administrator Air Vice-Marshal Sultan Mahmud urged upon the agency to sponsor in the construction of an international demonstration reactor (IDR) in Bangladesh. He suggested that IAEA could act as a catalyst to demonstrate the all-out viability of nuclear power in the small and medium sized power reactor (SMPR) range. The international demonstration reactor could be a joint venture of IAEA, the leading agencies, the country supplying the reactor and the recipient member country, especially of the Third World.

In the context of energy shortage which deters development in the Third World, this suggestion merits immediate attention. These countries have to spend almost all their export earnings to foot their oil bill alone.

Therefore, it is imperative that the potentialities of nuclear power as a cheap and abundant source of energy should be exploited by the developing nations. But most of these countries lacking financial capability need to be financed by financing organisations like World Bank, Asian Development Bank, OPEC fund and other international or private agencies. Arranging finance for installation of nuclear reactors by IAEA may be a step towards implementation of North-South dialogue on transfer of technology from the affluent to the poor.

The DCMLA observed that Bangladesh possesses necessary manpower and infrastructural facilities to install a IDR. Studies carried out in the past have already confirmed the feasibility of establishing such a plant in Bangladesh. Bangladesh, a signatory to Nuclear Non-proliferation Treaty (NPT), has also offered training facilities to personnel and dissemination of information regarding nuclear reactor to the member countries. This factor further strengthens her claim for priority.

Besides, feasibility study should be carried out in other countries. While doing so, care should be taken not to disturb the ecological balance by polluting the atmosphere with release of chemicals from the N-plants. In absence of a tight security and safety the basic purpose of development will fail. To reduce the widening gap between rich and poor countries the latter have no alternative but to rely on nuclear power which will ensure rapid industrialisation. But, the energy should be used for peaceful and developmental purposes and not for armaments.

CSO: 5100/7003

INDIA

LARGE NUCLEAR FUEL PROCESSING PLANT DEEMED VITAL

New Delhi PATRIOT in English 11 Oct 82 p 8

[Text]

BOMBAY, Oct 10 (UNI) — A big and central fuel reprocessing plant may become necessary if the growth and size of the domestic nuclear power programmes so warrants it in future.

Such a plant could be located at an independent site serving many nuclear power stations. But geographical and infrastructural factors play an important role in arriving at a decision, according to an article in the special issue of 'Nuclear India'.

The favoured capacity of the reprocessing plants in the country at present ranges between 100 and 200 tonnes annually.

While in industrialised countries large capacity centralised reprocessing plants may be favoured for achieving economies of scale, apart from other considerations. Experience has shown that the optimum capacity or such a plant is essentially a function of the parameters specific to the country in which it is located, the article says.

According to the article, the prominent parameters are the growth of spent fuel arising from the installed nuclear capacity, average capacity achievable, the useful life span of the plant, infrastructural constraints such as transport problems and environmental considerations.

The nuclear power programme in India envisages the achievement of an installed capacity of about 10,000 mw by the year 2000. This will be achieved by building a series of power stations comprising 235 mw reactors initially followed by 500 mw units later.

The technological base for reprocessing in radiated nuclear fuels has been well-established in the country and research and development efforts are mainly directed to strengthen the base.

Application of lasers in the nuclear sphere has opened up new vitas for further work and its potential use is being studied. Introduction of electrochemical method is also being considered.

CSO: 5100/7008

DELHI CONCERNED OVER 'FALLOUT' FROM TARAPUR ISSUE

Madras THE HINDU in English 18 Sep 82 p 9

[Article by G. K. Reddy]

[Text] NEW DELHI, Sept. 17.

The Secretary-General of the French Foreign Ministry, Mr. Francois Guttman, will be arriving in Delhi on October 7 for important bilateral talks with the Foreign Secretary, Mr. M. K. Rasgotra, on a number of issues including the nuclear question.

The visit of Mr. Guttman was fixed some time ago as part of the high-level exchanges under way between India and France to set the right tone for President Mitterrand's visit at the end of November to which both countries continue to attach considerable significance.

But his impending talks in Delhi have assumed additional importace in view of the persisting differences over the nature and extent of the safeguards to be applied to the French-supplied enriched uranium for the Tarapur nuclear power plant. As head of the French Foreign Minisry and also a close confidant of the Foreign Minister, Mr. Claude Cheysson, he will be able to discuss the problem at the political level without leaving it entirely to Frech nuclear experts.

As a prelude to Mr. Guttman's visit, the head of the French nuclear establishment, Mr. Michel Pecqueur, had a detailed discussion in Vienna with the Chairman of the Atomic Energy Commission, Dr. H. N. Sethna, in the light of the preliminary talks that took place in Delhi last week with Mr. Jacques Andreaue, the third senior-most functionary of the French Foreign Office.

Political-level talks: The tough stand taken by the French delegation at these talks left no scope at all for any accommodation on the applicability of the pursuit and perpetuity clauses. So it was decided by the two sides to elevate the dialogue to a political level to explore the possibilities of a compromise on the two inter-related provisions.

As the French are keen to get this problem out of the way before Mr. Mitterrand's visit, it has been decided that the heads of the two Foreign Ministries should personally deal with the issue at a semi-political level to narrow the differences and explore the prospects of a compromise acceptable to both sides. It is in this context that Mr. Guttman's visit is assuming special importance, since he will be coming with a comprehensive political brief to find a solution, if it is at all possible.

Govt's worry: But more immediately the Government of India is concerned about the fall-out of this nuclear controversy during the coming Parliament session which has been advanced by more than a month due to the Asian Games. The session begins on October 4, on the eve of these crucial talks with Mr. Guttman, and the Government expects a flurry of questions on the subject by the Opposition.

Both the Prime Minister, Mrs. Indira Gandhi, and the External Affairs Minister, Mr. P. V. Narasimha Rao, had assured Parliament during the last session that (1) India reserved the right to reprocess the spent fuel at a time of its choice in spite of American objections; (2) the French fuel supply would be within the framework of the 1963 agreement at the existing level of safeguards with no additional obligations; and (3) the IAEA safeguards end in 1993 with the expiry of the Indo-U.S. agreement.

It will be very difficult for the Government, in the face of these categorical assurances to Parliament, to make any substantial concessions on the twin issues of pursuit and perpetuity to meet the French requirements. The elucidation offered at the recent talks that a negative pursuit clause is already in operation in the sense that India is committed not to remove the nuclear materials or derivatives from the Tarapur premises has not satisfied France.

It remains to be seen whether Mr. Guttman arrives with any new ideas that will be acceptable to the two Governments. As far as India is concerned, Mrs. Gandhi is reported to be quite firm that there can be no concession of any kind on the perpetuity question. And this has been made abundantly clear to France during the recent discussions.

CSO: 5100/7002

PARLIAMENT PANEL CONCERNED OVER TARAPUR'S FATE

New Delhi PATRIOT in English 25 Sep 82 p 7

[Text] Members of the Parliamentary Consultative Committee attached to the External Affairs Ministry have expressed concern over the fate of the Tarapur Atomic Power Station in the wake of the French Government's insistence on tying additional safeguards to the question of supply of nuclear fuel for the plant.

The issue figured at a meeting of the committee on Friday and members generally voiced their criticism of the Government of India's handling of the matter. They were, however, reassured when External Affairs Minister P. Narasimha Rao declared that India would under no circumstance accept safeguards which were not envisaged by the 1963 Indo-US agreement on supply of nuclear fuel for Tarapur.

He asserted that our stand on this question would remain unchanged.

When several members wanted to know the exact nature of progress or otherwise of the current talks on the issue held with French officials, Mr Rao said the discussions with France were still going on and he could not say anything on the matter at this stage.

The Tarapur issue was raised by Mr Chandrajit Yadav (Janwadi) when the meeting was coming to a close. He asked how the 1963 Indo-US agreement on the subject could be binding on France which was not a party to the accord.

Mr Rao explained the whole situation by saying that due to domestic compulsions the US had expressed its inability to supply nuclear fuel for Tarapur and then it had itself brought France as alternate supplier of the fuel within the framework of the 1963 agreement.

French Angle

When a member still insisted to know if France had been brought in by the US, the Minister replied in the affirmative. Mrs Margaret Alva (C-S) claimed that even when Mrs Gandhi had visited France last year the French Government had offered nuclear fuel for Tarapur. This was, however, flatly denied by Mr Rao.

Mr Stayasadhan Chakraborty (CPI-M) said the USSR had offered to supply fuel for Tarapur. The Minister denied this too.

Mr Sadashiv Bagaitkar (LD) said the Indian public were disappointed because there had been a big press buildup during Mrs Gandhi's US visit that all problems including the one related to Tarapur had been solved. The main point now, according to him, was that Tarapur was being starved of fuel.

Mr P.K. Kodiyan (CPII) asked what would happen to the fate of the 1963 accord if no agreement was reached with France regarding the conditions it is keen to impose. Mr Rao said in such an eventuality the government of India would be free to take whatever action it deemed best from its viewpoint.

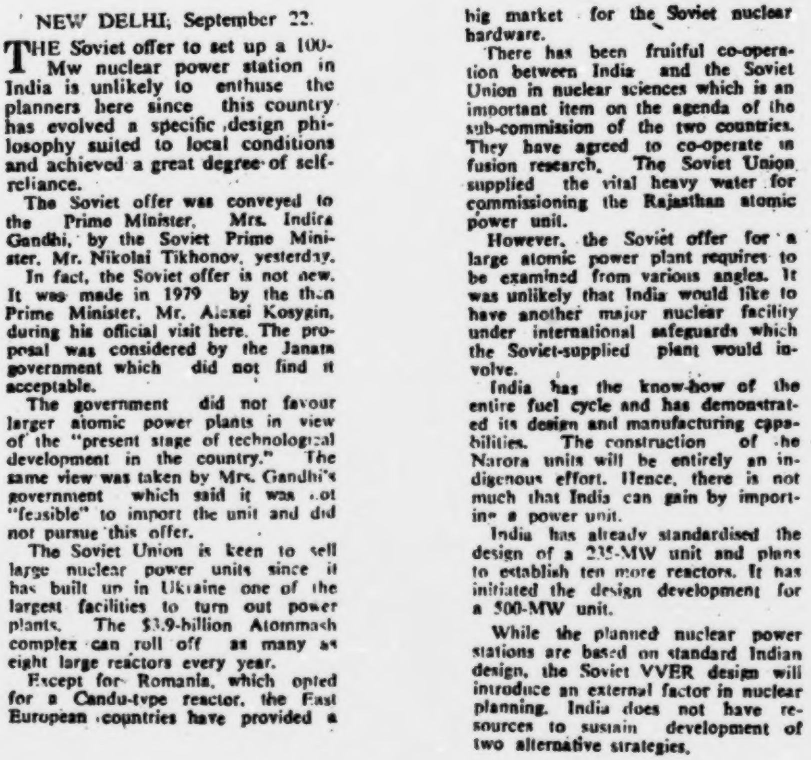
CSO: 5100/7204

SOVIET NUCLEAR PLANT OFFER MAY BE SPURNED

Bombay THE TIMES OF INDIA in English 23 Sep 82 p 9

[Article by L.K. Sharma]

[Text]



NEW DELHI, September 22.

THE Soviet offer to set up a 100-Mw nuclear power station in India is unlikely to enthuse the planners here since this country has evolved a specific design philosophy suited to local conditions and achieved a great degree of self-reliance.

The Soviet offer was conveyed to the Prime Minister, Mrs. Indira Gandhi, by the Soviet Prime Minister, Mr. Nikolai Tikhonov, yesterday.

In fact, the Soviet offer is not new. It was made in 1979 by the then Prime Minister, Mr. Alexei Kosygin, during his official visit here. The proposal was considered by the Janata government which did not find it acceptable.

The government did not favour larger atomic power plants in view of the "present stage of technological development in the country." The same view was taken by Mrs. Gandhi's government which said it was not "feasible" to import the unit and did not pursue this offer.

The Soviet Union is keen to sell large nuclear power units since it has built up in Ukraine one of the largest facilities to turn out power plants. The $3.9-billion Atommash complex can roll off as many as eight large reactors every year.

Except for Romania, which opted for a Candu-type reactor, the East European countries have provided a big market for the Soviet nuclear hardware.

There has been fruitful co-operation between India and the Soviet Union in nuclear sciences which is an important item on the agenda of the sub-commission of the two countries. They have agreed to co-operate in fusion research. The Soviet Union supplied the vital heavy water for commissioning the Rajasthan atomic power unit.

However, the Soviet offer for a large atomic power plant requires to be examined from various angles. It was unlikely that India would like to have another major nuclear facility under international safeguards which the Soviet-supplied plant would involve.

India has the know-how of the entire fuel cycle and has demonstrated its design and manufacturing capabilities. The construction of the Narora units will be entirely an indigenous effort. Hence, there is not much that India can gain by importing a power unit.

India has already standardised the design of a 235-MW unit and plans to establish ten more reactors. It has initiated the design development for a 500-MW unit.

While the planned nuclear power stations are based on standard Indian design, the Soviet VVER design will introduce an external factor in nuclear planning. India does not have resources to sustain development of two alternative strategies.

CSO: 5100/7006

AEC CHIEF SETHNA'S SPEECH AT VIENNA MEET REPORTED

New Delhi PATRIOT in English 15 Sep 82 p 5

[Text] BOMBAY, Sept 14 (PTI). Self-sufficiency in the field of nuclear power is 'no longer just a desirable objective, but has become an incapable necessity for India', to meet the increasing demands for energy, Chairman, Atomic Energy Commission Dr Homi N Sethna said in Vienna today.

Dr Sethna was presenting a paper on 'review of Indian Experience in Planning and Development of Nuclear Power and Fuel Cycle Programme' at the plenary session of the International Atomic Energy Agency (IAEA) conference on nuclear power experience, now in session in Vienna. His speech was made available here today.

Talking on the future fast breeder reactor programme of the country, he said that work was under way on the preliminary design of a 500 MW prototype fast breeder reactor.

A fast breeder test reactor now in advance stage of construction near Madras would help in the development of the required fast breeder technology in all its aspects, Dr Sethan added.

Discussing various means available to India for generation of electricity, Dr Sethna said that though coal was available in substantial quantities in eastern and central India, and exploration for oil and gas had begun in a big way the problem of transportation of coal and the impact of import of large quantities of oil on the balance of payment situation had forced India to look for other alternative sources for the near term and long term future requirements.

'No alternate sources of energy other than nuclear has been established to levels of assurance required for a sustained programme of our development', he said.

Explaining the Indian experience in planning towards self sufficiency in this field, Dr Sethna said this decision and strategy had been conditioned due to 'considerations other than techo-economical which governed international commerce in materials and equipment for nuclear power plants'. Such a step towards self-sufficiency had necessarily imposed on India 'severe strains in the early stages of the programme'.

Recounting the successes in this direction Dr Sethna mentioned that in parallel with attaining self-sufficiency in design capability there had been a progressive increase in the content and participation of the Indian industry in the fabrication of equipment both for nuclear and conventional parts.

Discussing steps being taken to reduce the project implementation time-span, he said that with achievement of standardisation and the induction of adequate domestic industrial capability, the time spent for implementation would be significantly reduced.

CSO: 5100/7001

SETHNA SPEAKS AT ATOMIC ENERGY PARLEY IN VIENNA

New Delhi PATRIOT in English 22 Sep 82 p 3

[Text] London, Sept 21 (PTI)--India today termed as meaningless safeguards in nuclear weapon states on only certain "self-selected" facilities.

Such safeguards do not serve any purpose and are a total waste of the meagre resources of the International Atomic Energy Agency (IAEA), chairman of the Atomic Energy Commission Dr H.N. Sethna told its general conference in Vienna.

Dr Sethna, who is leading the Indian delegation, is being specially honoured along with some other prominent figures in the field on the occasion of the silver jubilee of the agency. The Indian delegation includes Mr S.K. Singh, ambassador-designate to Austria who is on the agency's board of governors.

Dr Sethna said such formal safeguards can have little or no meaning as long as nuclear weapons programmes in nuclear weapon states continued unabated and unchecked.

Recalling that this was the silver jubilee of IAEA, Dr Sethna said it was a fitting occasion for all members to reaffirm faith in this organisation and its objectives as enshrined in its statute.

"Unfortunately in recent years these objectives have been sought to be eroded in building up certain concepts and issues that are and most always remain extraneous to its statute," he told the meeting.

India, Dr Sethna said, had always maintained that the primary function of agency was to promote utilisation of atomic energy for peaceful purposes and that the regulating role assumed by it "is but of secondary importance."

Calling for the removal of all forms of nuclear weapons from the face of earth, Dr Sethna recalled Prime Minister Indira Gandhi's five-point concrete programme of action in her message to UN special session on disarmament.

He drew specific attention to Mrs Gandhi's suggestion for a freeze on nuclear weapons providing for total stoppage of any further production of such weapons combined with a cut off in production of fissionable material for weapons purpose.

He reiterated India's continuing assistance to other developing countries and pledged a voluntary contribution of about 1.16 lakh US dollars. India would also contribute to make available 12 fellowships for the benefit of developing countries.

Pending a concensus on the question of financing technical assistance from regular budgets, Dr Sethna expressed India's support to the target of 19 million US dollars agreed to for 1983.

CSO: 5100/7005

'LA PRENSA' VOICES NEED TO INFORM PUBLIC OF NUCLEAR COSTS

Buenos Aires LA PRENSA in Spanish 15 Sep 82 p 1 sec 2

[Editorial]

[Text] The manufacture in this country of combustible nuclear elements necessary for the operation of the Atucha I plant can without doubt be described as a positive factor since it is an essential complement to the National Energy Commission's plan for setting up power plants for the production of electrical energy. The continued operation of the Atucha I plan, which in 1981 produced 8 percent of the energy provided through the public system, has already become essential for the daily activities of the country and it is fortunate that the fuel required can be provided without resorting to foreign supply which is subject to interruption for reasons beyond our nation's control. The fact that a second thermoelectric nuclear plan is under construction and that plans for a third are well advanced adds to the value of the production already obtained because the plant that has already started producing regularly will also be able to provide those elements for future plants.

The attendance of the national president at the ceremony at the Atomic Center in Ezeiza on the occasion of the turning over of the first 104 combustible elements for Atucha I made clear the government's desire to emphasize the significance of the technological and industrial advances which have been achieved. The ceremony was also an opportunity for a restatement of policy with regard to the implementation of the Argentine nuclear plan. It could also have been an opportunity to make clear, once and for all, that Argentina has decided against the manufacture of nuclear weapons which would have brought peace of mind to the greater part of Argentine public opinion whose traditional feelings are against the use of those horrible elements of total anihilation which, it is recognized, have the power to destroy, even though unintentionally, all of humanity.

Such a reaffirmation of the Argentine preference for worthwhile work, for peace and not for the destruction of the human race is what should have been heard at the ceremony at the Ezeiza Nuclear Center. It is no longer a secret, but rather a frightening absolute certainty that with the number and strength of the nuclear missiles that are ready for use all over the world, any trivial act could unleash, with the first destructive bomb, an uncontrollable total conflict.

This certainty, and the need to save our hemisphere from an increasingly obvious threat, years ago led our country to sign the Tlatelolco Treaty which prohibits the possesion, use or manufacture of nuclear weapons in Latin America. However, the treaty was never formally ratified even though during the presidency of Lt Gen Jorge Rafael Videla the need to do so was well recognized. The president was well as the then chairman of the National Atomic Energy Commission announced on various occasions that ratification was imminent but that decision never materialized.

On the other hand, the size of the investments which have been made makes it necessary that the country be continuously informed of the cost of the nuclear project, how much it is planned to spend, what are the secondary industries which have been established or may be established later on. It is also necessary to clarify what technical advances are being achieved and what are the reasons for insisting on the development of this source of energy, using funds and effort which could be applied to other traditional sources.

9204
CSO: 5100/2001A

CASTRO MADERO ON NUCLEAR PROJECT DELAYS

Buenos Aires LA NACION in Spanish 27 Sep 82 p 4

[Text] The chairman of the CNEA [National Atomic Energy Commission], Carlos Castro Madero, expressed his "concern" about the budget restrictions that will affect the nuclear plan, but he said that "all our institutions must make an effort to help to solve Argentina's economic problems."

Castro Madero spoke at Ezeiza yesterday, upon his return to Argentina after attending meetings of the IAEA [International Atomic Energy Agency] held in Geneva.

Delays in Atucha II

The head of the CNEA said that the budget cutbacks "will not affect" the Embalse nuclear power plant, "because it is a project that we need and it will soon be in operation," but he predicted that there will be delays in the start of operation of the heavy water plant and the Atucha II nuclear power plant.

Castro Madero attended two meetings in Geneva, one of a technical nature, at which Argentina presented six reports. One of these was about our development in the field of nuclear-generated electricity, which aroused great interest among the developing nations. He also attended a meeting of the organization's board of governors.

Safeguard Agreements

He said that "at the board of governors meeting he spoke of the need to do a study to bring into harmony the situation of the safeguard agreements established by the Non-Proliferation Treaty and the countries which are not members of that treaty, such as Argentina."

He said that his proposal was accepted, and that studies will soon begin to include the issue in the statutes. In February, at the next AIEA board of governors meeting, they will determine how well this analysis is moving.

Nuclear Submarines

He added that "at the meeting I repeated my disagreement about the use of nuclear submarines, because we feel that a nuclear power should not use this advantage against a country like Argentina which, because of its commitments to the principle of non-proliferation, is found at a clear disadvantage."

7679
CSO: 5100/2002

YRIART DRAWS LEAN MONTHS AHEAD FOR CNEA NUCLEAR PLAN

Buenos Aires ENERGEIA Spanish Sep 82 pp 672-673

[Article by Martin F. Yriart]

[Text] While EXECUTIVE INTELLIGENCE REVIEW, the U.S. journal that reports on business and state sectors in the developing world, and which is keeping an eye on Mexico now, is claiming that "London financial circles" have decided to set a quota on Latin American nuclear energy investments, and the engineer Alvaro Alsogaray, in his "minimum" program (a phraseology that recalls the old PC [Communist Party] strategies) is proposing to "revise the international commitments of the CNEA [National Atomic Energy Commission]," at the end of April the head of the CNEA began a new series of informative meetings with all levels of the CNEA, designed to explain the present situation, to answer questions, to clear up doubts, and reinvigorate the climate of this institution, of which it has often been said that it is an atypical organization within the Argentine political anatomy.

Vice Admiral Castro Madero took this opportunity at the middle of the year to present an overview of the status of the Argentine Nuclear Plan, whose salient points we will mention below.

As of 30 June 1982, Atucha I--which is now shut down for scheduled maintenance--had produced 1,511,790 gross MWh (62 percent of the goal set by the CNEA for the present calendar year) and 1,422,310 net MWh (66.6 percent of the goal agreed upon with the department of energy for 1982). During the first half of 1982, the load factor for Atucha was 97.74 percent, a figure that amazes people already impressed with the achievements of this program.

On 18 May, Atucha's second pool building received its first irradiated fuel element, thus marking the actual beginning of its operation.

At Embalse, the first 6 months of 1982 ended with 99 percent of the assembly completed; there are a few additional systems remaining which will be finished before the end of the year. In the conventional area, 90 percent of the work required for starting operations has been completed, including the testing of the turbogroup at its nominal velocity and its synchronization with the 132 Kv system. But in the nuclear area, only 20 percent of this work is finished "because of delays in the transfer of systems, due to normal problems with assembly and changes in engineering design, and also because of the lack of some minor materials." In the meantime, 81 percent of the professional operating staff and 70 percent of the technical staff have been hired.

A study conducted by Ebasco for the CNEA last May said that the date for going critical established by the Embalse contractors (Atomic Energy of Canada Ltd and Italimpianti S.p.A.), 28 November, could be delayed until the first of May next year.

According to Ebasco, the foreseeable delays may be attributed to:

1. The transfer of systems from the construction group to the operational group (7 weeks);

2. The start of operation of the primary heat transport system (6 weeks); and

3) Additional tests to be made of the high pressure cooling system (2 weeks).

This amounts to a total of 15 weeks, to which Ebasco added another 6 weeks for "any possible contingencies."

This study also showed, according to Castro Madero, the high level of the CNEA staff, the meticulous nature of the construction, and the high level of the procedures and documentation being used.

A new study undertaken to "determine the real engineering capability which AECL [Atomic Energy of Canada Ltd] has available in Canada to begin operations at Embalse and to handle changes required during the start of operation of the Lepreau and Gentilly 2 plants" is now in progress, with the participation of Ebasco and the CNEA.

The Atucha II construction schedule has been adjusted downward to suit the present situation of our national economy. This means that barely 53 percent of the work scheduled for the first half of 1982 is completed, and new purchasing orders have been suspended. Minimal levels are being maintained for supplies ordered from national sources, and investments are being held to the minimum compatible with contract commitments for imported items.

Castro Madero reported that studies are continuing for the central section. He also said that the RA-6 is expected to begin operation during September.

The situation of supplies for nuclear power plants also reflects the nation's present economic conditions. Two programs that have suffered considerably are the drilling program in the Sierra Pintada and the aerial prospecting program in Cordoba. The Cordoba program has been particularly hard hit by the continuing decline of the peso in relation to the dollar.

Net uranium reserves, in terms of "reasonably certain resources" (IAEA [International Atomic Energy Agency]), had a net increase of 313 tons of concentrate--this figure is determined by subtracting the reserves mined during this period--so Argentina's total reserves in this category amounted to 30,363 tons of U308 on 30 June 1982.

The production of concentrate remained at the expected levels, with records being reached in Malargue and San Rafael. 4.6 tons were prepared for shipment to the Soviet Union, where they are to be used to produce 20 percent enriched uranium, while another 59.4 tons were to be used to meet contract commitments with Brazil.

In Cordoba's Los Gigantes field, the programs planned for the first 6 months of 1982 were carried out at a level of 99 percent, while at La Estela in San Luis, the CNEA has given the contractor a 12-month extension to begin the delivery of ammonium diuranate, a term that will come to an end on 1 December.

The opening of bids for the Sierra Pintada field has been postponed until the end of November, because the Falklands conflict kept the Argentine firms interested in taking part from reaching agreements with the foreign firms that are to provide technology, as required in the list of conditions set by the CNEA.

In Cordoba's uranium dioxide conversion plant, final preparations have begun with the assistance of RBU (Germany) technicians, while the work in progress is being completed, and it is hoped to have the plant in operation before the end of this year.

During the first 6 months of 1982 the Nuclear Fuel Elements Plant at Ezeiza began to operate. By 30 June it had produced 65 elements of the Atucha I type, but the activities of the Special Alloys Plant have been delayed, in some areas up to 5 months, even though the results of the pilot plant's operation have been satisfactory.

Finally, at the industrial heavy water plant at Arroyito, while the production of the processing equipment by the contractor, Sulzer Bros, was 90 percent completed during the first half of 1982, the execution of the civil engineering work was barely at a level of 30 percent of what had been scheduled. 55 percent of the imported supplies were in Argentina as of 30 June.

The panorama depicted by Castro Madero does not differ in any substantial way from what was expected at the beginning of the year, which is some slight consolation. Some activities, which are now in the terminal phase of execution (Embalse, the dioxide plant, RA-6) are in a good position to receive a final dose of the resources needed to have work completed, and before 31 December the CNEA may be able to list another two or three openings in addition to those already occurring this year, of the FECN [Nuclear Fuel Elements Plant] and the High Pressure Test Circuit.

But without being overly pessimistic, we must recognize that the situation for the next few months for the CNEA is no less bleak than for the rest of our national economy.

7679
CSO: 5100/2002

FURTHER DETAILS ON HIGH PRESSURE TEST CIRCUIT PUBLISHED

Buenos Aires ENERGEIA in Spanish Sep 82 pp 666-668

[Text] A Tool for Development

The Argentine Nuclear Plan sets as a goal to achieve our national capacity of designing and building nuclear power plants. The formulation of this goal is the logical outcome of an evolution that began with the construction of small experimental reactors at first, and then continued with the growing participation of Argentine industry in providing supplies and equipment for power reactors.

This progressive development of Argentine nuclear technology, both in engineering and in industry, is creating new needs for the research and development infrastructure.

The CNEA's [National Atomic Energy Commission] High Pressure Test Circuit--also called a "loop"--responds to these needs, since it is now possible to test and develop nuclear fuel elements, critical components of reactors and high power and volume pumps with multiple applications, to simulate thermohydraulic and mechanical processes, and to acquire experience with the characteristic problems of the conventional (non-nuclear) industry, thus helping to improve designs and contribute to the development of basic engineering in Argentina.

The experience acquired is also applicable to processes involved in the inspection and repair of nuclear power plants and other nuclear facilities. The basic engineering for the High Pressure Test Circuit was done by the CNEA with the assistance of the Nuclear Research Center of Karlsruhe.

The Federal Republic of Germany, through the Argentine-German Cooperation Agreement, supplied part of the mechanical components, instrumentation, and process control.

The CNEA assumed responsibility for the detailed engineering and the direction and inspection of construction. It also prepared the manuals for the start of operation, operation, the assurance of operating quality, and maintenance of the entire test circuit. The firms Kraftanlagen A.G. and Nuclar S.A. took part in the engineering, assembly, and start of operation.

The High Pressure Test Circuit is designed to meet the demand for a nuclear fuels and components test capability, generated by the Argentine Nuclear Plan and the development of engineering and the nuclear industry in Argentina. It has a flexible design so that different types of test sections can be installed, not just for fuels or pump and valve types of equipment, but also for other types of equipment of greater complexity or size, such as loading machinery or steam generators.

With this type of facility in operation, Argentina has now moved to a leadership position in Latin America in the field of nuclear engineering.

Circuits

The purpose of the High Pressure Test Circuit is to reproduce the conditions of temperature, pressure, and flow volume to which the components of a power reactor are subject in the primary circuit of a nuclear power plant.

It has a set of equipment installed on various pipes and ducts. The main pump is installed on the so-called "primary" part of the test circuit. Its dual mission is to cause the fluid to circulate within this circuit, and to raise its temperature to 300°C. There is also a pressurizer which, through 72-kW electric heaters, can generate a pressure of up to 100 bar.

Another key component is the heater, which is used to make fine temperature adjustments at the insertion point of the component to be tested. This equipment also has valves, filters, and heat exchangers. All this is used for the test section, which is part of the primary circuit.

There is a secondary circuit designed to regulate the water's temperature and chemical purity, and to compensate its volume and flow.

Testing

A number of types of test equipment can be connected to the main circuit. The test section for Atucha-type fuel elements is a container almost 7 meters high with a diameter of something a little more than 20 cm. Within this section are reproduced the temperature, pressure, and flow conditions existing in a fuel duct of the reactor.

Two clamps in the primary circuit can be used to connect other test sections with different characteristics. In these sections it is possible to test ducts, fuel elements, valves, and spare parts for reactors of the Embalse type.

Other equipment can be used to study corrosion phenomena, which will help to provide a better knowledge of the chemistry of nuclear reactors.

The Test Bench

Three units make up the High Pressure Test Circuit facility: the main bay and tower building, the control room and control panels building, and the water treatment and auxiliary services building.

The main bay has a maximum height of 15 meters and is equipped with a 5-ton crane. This bay houses the various components which can generate the temperature, pressure, and water flow of the circuit, along with complementary facilities.

The dimensions of the main bay are adequate to install in it different test circuits for fuel elements and nuclear components, to the extent required.

The tower, which forms a unit with the main bay, has a maximum height of 30 meters and is equipped with a 3-ton crane. The height of this tower responds to the need to move about inside it, in a vertical position, fuel elements of the Atucha type, which can measure up to 7 meters in length.

The tower houses the structure of the test section for fuel elements, which reproduces the pressure, temperature, and water circulation conditions which fuel elements encounter in a nuclear reactor.

The test circuit is operated from the control room and panels building, where the circuit's control consoles are located--with direct access to the main bay--along with the electrical panels.

The operation of the circuit and the control of the experiments are handled from the control room, where all variables of the process are recorded. Finally, the High Pressure Test Circuit facility has a water treatment and auxiliary services building. This houses the water treatment plant, which uses demineralized water, and the chemical control laboratory which ensures the quality of the water.

For its electricity supply, the circuit has a yard with a three-phase transformer with a vat, which can meet the electricity requirements, which are 800 kVa at 380 volts.

Assurance of Quality

The safety of a nuclear reactor depends on the design and conditions in which the components of its primary circuit are manufactured.

Pumps, valves, seals, fuel elements, and other parts which are used in the reactor are subject to very harsh operating conditions, and must therefore respond without fail, and ensure that the reactor core will be kept adequately cooled.

All these critical components are tested in the High Pressure Test Circuit, in order to ensure that their design and construction will be adequate.

To understand its operation, we should recall how a nuclear power plant operates. A nuclear power plant of the Atucha or Embalse type, using pressurized heavy water and natural uranium, only differs from a conventional thermal plant in the fact that the nuclear plant uses a nuclear reactor instead of the furnace that burns either coal or oil.

The reactor consists of a pressurized container (in the case of Atucha) or a "calendar" through which pass pressurized tubes (in the case of Embalse) in which the fuel elements are located.

The fuel elements are clusters of hermetically sealed metal tubes; inside these tubes are the uranium pellets which supply their energy to the reactor.

The reactor is kept going because heavy water circulates between the rods; this heavy water acts as a moderator, reducing the energy of the neutrons produced during the fission of the nuclei of the uranium 235 atoms. Heat is generated in the fission process, and this heat is extracted by means of the heavy water, which also acts as a coolant.

To do this, large pumps cause the heavy water to circulate, removing it from the reactor and sending it to the steam generators. When it goes to the generators the heavy water, leaving the reactor with a temperature of about 400°, delivers its thermal energy to a light water duct which flows along the external part of the generator and transforms it into steam, which will drive the turbine.

The entire heavy water circuit is maintained in a liquid state by means of a pressurizer which controls it through electrical resistances.

Another smaller closed circuit regulates the temperature of the moderator. Various types of pumps, valves, filters, etc. also combine to make up this system, which is known as the "reactor's primary circuit."

The fuel must be constantly renewed, so a loading machine is used. This is a pressurizable bottle that can be connected to and disconnected from the reactor without causing the reactor to lose pressure. This system is used to remove depleted fuel elements which are replaced by fresh elements.

The High Pressure Test Circuit replaces the operating conditions of a power reactor, with the exception that in the test circuit there is no fission, and consequently, no neutron flow. But the temperature, pressure, and water flow are identical.

This result is obtained by the use of a powerful pump which has the dual function of driving the water through a closed circuit and raising its temperature.

A pressurizer, similar to the one used in a reactor, creates the requisite pressure, and a heater regulates the temperature at the test channel intake. The flow in this circuit is about 200 cubic meters per hour. The temperature reaches 300°C, and the pressure, 100 bar.

7679
CSO: 5100/2002

BRAZIL

BRIEFS

NUCLEBRAS TRIES TO ACCOMODATE ENVIRONMENTALISTS--Peruibe and Iguape, Sao Paulo--NUCLEBRAS has decided to modify its strategy for the installation of nuclear plants in order to accomodate the reaction of environmentalists and to be in consonance with the process of political opening now under way in the country. In Sao Paulo, where two nuclear plants will be built, NUCLEBRAS has already adopted the new strategy that consists in making heavy investments in the infrastructure of cities where nuclear plants are built. Up to now nuclear plant projects were designed as separate projects, unrelated to the host cities, by federal government decision based on the concept of national security. Henceforth, these projects will be conceived as economic projects for which regional authorities will be consulted to determine the political advisability of such projects and the possibility for implementing them as common investments. [Excerpt] [PY191336 Rio de Janeiro O GLOBO in Portuguese 18 Oct 82 p 14]

FUEL ELEMENTS FACTORY DEDICATION--President Figueiredo today arrived in Resende [Rio de Janeiro State] at approximately 1500 to dedicate a factory of fuel elements, FEC, built by NUCLEBRAS at a cost of $13 billion. The plant will produce 100 tons of uranium (?concentrate) which will be sufficient to reload for the first time a 1,000-megawatt reactor. [Excerpt] [PY210118 Brasilia Domestic Service in Portuguese 2200 GMT 20 Oct 82]

CSO: 5100/2006

STATE COUNCIL ISSUES PEACEFUL NUCLEAR ENERGY DECREE

Havana GACETA OFICIAL in Spanish 26 May 82 Extraordinary Issue, No 26, pp 95-100

[Text] Council of State

Fidel Castro Ruz, president of the Council of State of the Republic of Cuba,

Announces: That the Council of State has approved the following:

Whereas: Scientific and technical progress opens broad prospects for the peaceful use of nuclear energy and constitutes a very important factor for the socioeconomic development of the country and progress in the construction of socialism.

Whereas: The planned future economic development of our country includes important tasks related to the development of nuclear energy.

Whereas: The development of nuclear energy, because of its great complexity, requires the coordinated participation of different state organs and institutions whose activities must be the subject of the corresponding legal regulation in order to achieve greater effectiveness.

Whereas: The start-up and exploitation of the installations associated with the development of nuclear energy imply risks for workers exposed occupationally to radiation, for the population in general and for the environment, risks that must be prevented through the adoption of measures backed by legal norms that guarantee compliance.

Whereas: The appropriate legislation of the development of nuclear energy will also help insure fulfillment of the international commitments assumed by the Cuban state in this sector.

Therefore: The Council of State, aware of the importance of the use of nuclear energy for peaceful purposes in the construction of the socialist society, the advantage of having an effective legal regulation for the orderly development of this activity and to achieve its objectives, in use of the prerogatives conferred in clause c of Article 88 of the Constitution of the Republic, agrees to dictate the following:

Decree-Law No. 56

"For the Regulation of the Peaceful Use of Nuclear Energy"

Chapter I

Objectives and Definitions

Article 1. The present decree-law has as its objective:

a) To establish the basic legal norms for the appropriate use of nuclear energy for peaceful purposes within national territory, guaranteeing that it serves the interests of all the working people and improves their standard of living.

b) To establish the measures that, considering the risks derived from operations related to nuclear materials, radioactive substances and other sources of radiation, insure protection of the health of the workers exposed occupationally, of the population living near the nuclear installations and of the population in general as well as of goods and the environment.

c) To regulate the way to meet the commitments assumed by the Cuban state through pacts and other international agreements on nuclear energy within national territory.

ch) To work toward uniformity in mechanisms to regulate and control activities related to the peaceful use of nuclear energy.

d) To organize effective accounting and control of nuclear materials, the physical protection of these materials, radioactive substances and other sources of radiation, the security of nuclear installations and radiological protection from the risks of exposure to radiation.

e) To establish the general conditions for granting the corresponding licenses.

f) To establish responsibilities and sanctions for noncompliance with its provisions.

Article 2. In order to facilitate the correct interpretation and application of the provisions of the present decree-law, the following terms are defined below:

a) Radiation: any radiation formed by directly or indirectly ionizing particles or by a mixture of the two.

b) Sources of radiation: a machine, device or substance capable of emitting radiation.

c) Exposure: act of a person being exposed to radiation.

ch) Worker exposed occupationally: person who works directly with sources of radiation or who, due to the nature of his job, is exposed to this radiation.

d) Nuclear material: any basic material or special fissionable material which, for the effects of the present decree-law, are as follows:

> Special fissionable materials:
> Plutonium 239; uranium 233; enriched uranium with isotopes 235 or 233; any material that contains one or several of the mentioned elements.
>
> Basic materials:
> Natural uranium; impure uranium and thorium; and any of the mentioned elements in the form of ore, alloy, chemical compound or concentrate.

e) Nuclear installation: any place where nuclear material is habitually used in quantities of more than 1 true kilogram with the exception of places where the materials are stored incidentally during their transportation.

f) Radioactive installation: radioactive installations are defined as:

1. Installations of any type that contain a source of radiation.
2. Buildings, laboratories, factories and installations where radioactive substances are produced, stored or handled.

g) User: the natural or legal person named on the required license for the start-up and exploitation of a nuclear or radioactive installation.

h) Risk: probability that a short or long-term harmful effect will occur, whether to the health of individuals or populations or to material goods or the environment.

i) Damage: any death or impairment of the health of persons or total or partial loss of material goods due to a radiological accident or waste disposal.

j) Radiological accident: any unforeseen event which can cause exposure of persons or the dispersion of radioactive substances in the environment in greater quantities than the limits set by existing regulations.

k) General emergency plan: set of planned actions to be carried out by each of the organisms responsible for a certain task in case there is a situation of nuclear emergency.

l) Situation of nuclear emergency: any radiological accident which, as a consequence, would mean surpassing the limits of exposure stipulated by the Cuban Commission on Nuclear Energy, keeping in mind the levels of acceptable risk for these cases.

Chapter II

On the Cuban Commission on Nuclear Energy and the Executive Secretariat for Nuclear Affairs

Article 3. The Cuban Commission on Nuclear Energy is the organ responsible for directing and controlling nuclear activities in national territory and, with this objective, will carry out the tasks that the Council of Ministers or its Executive Committee entrusts to it.

This commission is subordinate to the Council of Ministers.

The different organisms of the Central State Administration and the people's government organs, within their respective jurisdictions, will offer the commission the cooperation it requires for the fulfillment of its functions.

Article 4. The Cuban Commission on Nuclear Energy is aided in its functions by the Executive Secretariat for Nuclear Affairs, adscript to the Council of Ministers.

Article 5. The make-up and functions of the Cuban Commission on Nuclear Energy and the Executive Secretariat for Nuclear Affairs will be determined by the Council of Ministers.

Chapter III

On Licenses

Article 6. The license is the authorization, contained in an official document, granted for the realization of any pertinent act of importation, acquisition, use, operation, processing, transportation, transfer, evacuation, storage or exportation of radioactive substances or other sources of radiation and nuclear materials.

That document establishes the requirements and conditions for the exercise of these activities as well as the length of time it is valid.

The licenses to which the above paragraph refers will be granted by the Executive Secretariat for Nuclear Affairs according to the norms and requirements set forth in this decree-law and in the regulation dictated for that effect.

Article 7. In the case of important nuclear and radioactive installations, the license will be issued for a specific stage or phase. In granting these licenses, there will be approval for the following stages: emplacement, construction, start-up, exploitation and shutdown.

Chapter IV

On Systems of Regulatory Measures

Section 1

On Systems

Article 8. A system of regulatory measures is defined as the set of norms established for the regulation, approval, supervision and registration applicable to the importation, use, operation, storage, production, processing, transportation, evacuation and exportation of nuclear materials, radioactive substances and other sources of radiation within national territory, aimed at reducing the risks derived from these operations to the minimum.

Article 9. The systems of regulatory measures are as follows:

a) National System of Accounting and Control of Nuclear Materials.

b) Physical Protection System for Nuclear Materials, Radioactive Substances and Other Sources of Radiation.

c) Security System for Nuclear Installations.

ch) National Radiological Protection System.

Section 2

On the National System of Accounting and Control of Nuclear Materials

Article 10. The National System of Accounting and Control of Nuclear Materials is defined as the set of measures aimed at making accounting and control as well as reports and notifications required in this activity possible.

Article 11. The objectives of the National System of Accounting and Control of Nuclear Materials are as follows:

a) To contribute to the efficient and economic management of nuclear materials through the adoption of appropriate measures of inspection, measurement, inventory, registration, reporting and verification.

b) To guarantee fulfillment of international commitments that the Cuban state has assumed concerning nuclear materials used in national territory.

Article 12. The National System of Accounting and Control of Nuclear Materials is established at the national level and in every nuclear installation that uses more nuclear material than the minimum amount set forth in the corresponding regulation.

Article 13. The Executive Secretariat for Nuclear Affairs will be responsible at the national level for regulating, supervising and controlling the necessary measures to guarantee that the obligations of accounting and control of nuclear materials are carried out throughout national territory.

Article 14. In order to fulfill the above article, the Executive Secretariat for Nuclear Affairs has the following functions:

a) To regulate the pertinent acquisition, importation, use or operation, storage, production, processing, transportation, transfer, evacuation and exportation of nuclear materials.

b) To guarantee verification of the accounting and control of nuclear materials by each user of a nuclear installation in the country.

c) To carry out the corresponding procedures with the OIEA [International Atomic Energy Agency] concerning execution of agreements on this sector.

ch) The Executive Secretariat for Nuclear Affairs will represent the Cuban state in its relations with homologous organs of other countries and with specialized international organisms concerning accounting and control of nuclear materials. The Ministry of Foreign Relations will collaborate with the Executive Secretariat for Nuclear Affairs in everything related to these activities.

Article 15. The accounting and control in each nuclear installation that requires it will be done by the user of the installation involved, according to the regulation that the Executive Secretariat for Nuclear Affairs dictates.

Section 3

On the System of Measures for Physical Protection of Nuclear Materials, Radioactive Substances and Other Sources of Radiation

Article 16. The System of Measures for Physical Protection of Nuclear Materials, Radioactive Substances and Other Sources of Radiation is defined as the set of measures of containment, vigilance and physical care adopted to prevent the unauthorized use of nuclear materials, radioactive substances and any other source of radiation.

Article 17. The objective of the System of Measures for Physical Protection of Nuclear Materials, Radioactive Substances and Other Sources of Radiation is to create conditions that make it possible:

a) To prevent and limit the possibilities of unauthorized extraction and deflection of nuclear materials, radioactive substances and other sources of radiation.

b) To avoid the risk of acts of sabotage against installations that use nuclear materials, radioactive substances and other sources of radiation.

c) To prevent uncontrolled use of nuclear materials, radioactive substances and other sources of radiation.

ch) To provide the necessary information and technical aid to support the decisions that must be made in case the events expressed in clauses a, b and c occur.

Article 18. The Executive Secretariat for Nuclear Affairs, in coordination with the Ministry of Interior, will be responsible for regulating activities related to the physical protection of nuclear materials, radioactive substances and other sources of radiation adapted to the norms of the regulation dictated to this effect.

Section 4

On the System of Security Measures for Nuclear Installations

Article 19. The System of Security Measures for Nuclear Installations is defined as the set of measures that guarantee, under conditions of maximum security, the emplacement, plan, design, construction, start-up, exploitation and shutdown of nuclear installations, keeping in mind the specific risks of those installations.

Article 20. The System of Security Measures for Nuclear Installations has the following objectives:

a) To establish the general security conditions and requirements and answer for their fulfillment.

b) To guarantee the examination and approval of the emplacement, construction, design, start-up, operation and shutdown of nuclear installations.

c) Not to grant or to withdraw the corresponding license in case the established security conditions and requirements are not met.

ch) To adopt appropriate measures for shutdown once the useful life of the installation involved is over.

Article 21. The measures in this system include regulation of the following aspects among others:

a) Selection, evaluation and approval of emplacement.

b) Evaluation and approval of the project and design of the installation.

c) Verification of correspondence between construction and design.

ch) Control and supervision of the program controlling the corresponding guarantees and certificates of quality.

d) Establishment of requirements for the operational personnel and approval based on the level required in each case.

e) Approval and control of the start-up program of the installation.

f) Establishment and control of operational limits and conditions.

g) Approval and control of the operational program.

h) Approval of the plan of measures for emergency situations.

i) Verification of the efficiency of the security systems and devices.

j) Systematic control over the environment.

k) Establishment and control of the program for the shutdown of the installation.

l) Control of supplies and transportation of nuclear materials, components and installations.

Article 22. The Cuban Commission on Nuclear Energy is empowered to dictate the necessary regulations for the appropriate application of the System of Security Measures for Nuclear Installations. The Executive Secretariat for Nuclear Affairs will be responsible for supervising and controlling their application.

In order to receive cooperation in some of the functions assigned to it, it can establish technical advice committees consisting of its own skilled personnel or personnel from other organisms.

Article 23. The Ministry of the FAR, the Ministry of Interior and the local people's government organs, in coordination with pertinent national organisms, must organize national and local operation centers to confront emergency situations.

These organisms, in coordination with the Cuban Commission on Nuclear Energy, will adopt measures for emergency situations.

The Cuban Commission on Nuclear Energy will review, evaluate and approve general emergency plans and will advise on their integration with other, nonnuclear emergency plans. It will also evaluate the nature and magnitude of every radiological accident in order to determine whether it constitutes an emergency situation.

Section 5

On National Radiological Protection System

Article 24. The National Radiological Protection System is defined as the set of measures to insure that the exposure to radiation of individuals, the population and the environment remains within internationally accepted limits.

Article 25. The National Radiological Protection System has the following objectives:

a) To carry out, without additional risk, any activity related to the peaceful use of nuclear energy.

b) To insure the protection of the worker exposed occupationally, the population as a whole and the environment against the harmful effects of radiation.

Article 26. The Cuban Commission on Nuclear Energy is empowered to dictate the necessary regulations to:

a) Guarantee that any practice that implies exposure is justified; to insure that the established limits of dosage are never violated; and to maintain the amount of exposure at the lowest level that can be reasonably achieved.

b) Limit exposure from natural sources intensified by technological practices.

c) Limit exposure from the dispersion of radioactive substances in the environment, limit and control radioactive discharges, avoid the dispersion of radioactive contaminants that can affect man or alter the ecological balance and insure appropriate management of radioactive waste.

ch) Guarantee safe transportation and storage of radioactive substances.

d) Learn and evaluate the magnitude and consequences of every radiological accident.

Article 27. The National Radiological Protection System will be carried out at the national level and in every installation where nuclear materials, radioactive substances and other sources of radiation are used.

Article 28. The Executive Secretariat for Nuclear Affairs will be responsible for the organization, supervision and control of the National Radiological Protection System at the national level. To that effect, the Cuban Commission on Nuclear Energy will dictate the necessary regulations.

The Ministry of Public Health will be responsible for regulating this system in its X-ray installations and for carrying out operational control of radiological protection in the radioactive installations where there is no justification to have a radiological protection service of their own. It is also responsible for exercising the necessary medical supervision of all workers exposed occupationally in accord with the regulatory norms dictated.

The State Committee for Labor and Social Security will be responsible for drawing up the labor provisions that will be applied to the workers exposed occupationally based on job specifications, sex, etc.

Article 29. The Cuban Commission on Nuclear Energy will be responsible for integrally regulating and controlling activities aimed at preventing and avoiding radioactive contamination of the environment within the context of the National System for Environmental Protection and Rational Use of Natural Resources established by Law No. 33 of 10 January 1981.

Chapter V

On Civil, Administrative and Labor Responsibility

Section 1

On Civil Responsibility

Article 30. The enterprises and other state entities are responsible and have the obligation to pay for damages caused to other organizations or to private persons by the use or handling of nuclear materials, radioactive substances and other sources of radiation.

There is no obligation to compensate if the damage is caused by the recklessness or negligence of the victim but, in fairness and if the circumstances justify it, that obligation may also extend to this case.

The enterprises and other entities will have the right to demand what they have paid in compensation from the causer of the damage.

If it is not possible to determine the party responsible for the damage or if it is an insolvent organization, the state will be obliged to compensate.

Article 31. The demand for damages referred to in the above article and the extension and amount of the compensation will be adapted to the corresponding provisions of existing civil legislation.

Section 2

On Administrative Responsibility

Article 32. Infractions of the conditions and requirements contained in the licenses granted, according to Article 6 of the present decree-law, will be sanctioned with administrative measures, without prejudice to demanding penal responsibility for the infraction.

Article 33. The applicable administrative measures will be as follows, depending on the gravity of the case:

a) Suspension of the license for up to 6 months.

b) Revocation of the license.

Article 34. The measures in the above article will be imposed by the Executive Secretariat for Nuclear Affairs.

Article 35. The measures to which Article 32 refers will be carried out immediately and will have no appeal.

However, the Executive Secretariat for Nuclear Affairs can nullify the measure imposed at the well-grounded request of the violating entity.

Section 3

On Labor Responsibility

Article 36. The Executive Secretariat for Nuclear Affairs will communicate to the authorities empowered to impose disciplinary measures any violation by officials or leaders subordinate to them of the duty to impose disciplinary measures on the workers at nuclear installations or those who, in some way, are involved with nuclear materials, radioactive substances and other sources of radiation concerning the responsibility which can be incurred based on the existing legislation on responsibility and discipline of officials and leaders.

Final Provision

Any legal provisions and regulations opposed to the present decree-law which will go into effect upon publication in the GACETA OFICIAL DE LA REPUBLICA are repealed.

Given in the Palacio de la Revolucion in Havana City on 25 May 1982.

[Signed] Fidel Castro Ruz

7717
CSO: 5100/2003

SOUTH AFRICA

ABILITY TO MAKE ATOM BOMB CLAIMED

Johannesburg THE STAR in English 29 Sep 82 p 29

[Article by Jaap Boekkooi: "Whose Basements Have a Bomb?"]

> [Text] Jaap Boekkooi discusses a style of diplomacy which involves playing a kind of nuclear blind man's bluff and counterbluff to create deterrence by revealing nothing.

A proliferation of recent books on South Africa's nuclear capability no longer ask if this country can make an atom bomb, but how many have already been made and stockpiled.

An estimate that South Africa has a stockpile of 10 nuclear devices is made by former atomic science bulletin editor Samuel Day in his new book "The Afrikana Bomb." (sic)

Day's estimate is based on the amount of enriched uranium--with plutonium the main ingredient of an atom bomb--which should have been produced by the giant Valindaba enrichment plant before it reaches full-scale production of 50 tons a year in 1985.

Day also says it is now fairly easy for Valindaba to make the highly concentrated weapons-grade nuclear explosives for bombs.

The plant has produced 45 percent enriched uranium as an emergency supply for the Safari nuclear reactor, which the Americans have refused to supply with fuel for years. This, says Day, can easily be reenriched to the 90 percent required for a full-fledged nuclear weapon.

Statements about the 45 percent enrichment were made by the Minister of Energy, Mr F W de Klerk, and former director of the Atomic Energy Board, Dr Ampie Roux, giving rise to suggestions that South Africa was trying to "tell" something about its nuclear capabilities.

Another nuclear book, "Two Minutes Over Baghdad," written by Israel's Uri Bar-Joseph and Amos Perlmutter, with Harvard University researcher Michael Handel, speculates on nuclear cooperation between South Africa, Israel and Taiwan.

This has led, the authors say, to nuclear warheads which can be fired from a 155 mm cannon; tactical weapons which can explode over a target 40 km away from firing.

On the heels of this came the announcement this month that Armscor had produced a new 155 mm cannon, the G6. This, as the announcement said coincidentally, could fire a Nato nuclear warhead accurately at a distance of 40 km.

This distance is the ideal one in the phase where guerrilla and conventional warfare start to overlap. But Armscor has denied it possesses nuclear shells.

The "Baghdad" authors again talk of a 155 mm cannon when they say this was the weapon used to fire a nuclear warhead which caused the now notorious "double flash" 8 000 m above the South Atlantic in September 1979, an event which caused world headlines and was seen as a sign of a South African explosion.

This, and allegations of close nuclear cooperation by the Israel-South Africa-Taiwan "pariah axis" mentioned by the "Baghdad" authors, is part of the flurry in international nuclear circles which has intensified since 1977.

In that year Russian and American satellite photo interpreters concluded that a series of constructions in a part of the Kalahari could only be a preparation for a South African underground nuclear test.

South African policy, as expressed by the Atomic Energy Board then and now, has been to deny the allegations, speculation and insinuations, to reiterate the country's commitment to peaceful nuclear purposes, and to maintain the lowest possible profile.

Nothing here of the open bragging match between traditionally hostile countries such as Pakistan and India, shaking their fledgling atomic fists at each other, with concurrent talk about an "Islam bomb" and waging a nuclear Jihad (holy) war.

South Africa's diplomacy in nuclear affairs is much closer to Israel's, a country estimated to have a nuclear stockpile of 200 bombs, according to the CIA and the "Baghdad" authors.

Both represent a style known as "bomb in the basement" diplomacy. This aims at playing a kind of nuclear blind man's bluff and counterbluff to create an atmosphere of deterrence by pure silence.

According to this line of diplomacy, by refusing to say whether it has atom bombs or not, South Africa can achieve much more than by demonstrating a bomb, which would have a destabilising effect.

Israel has developed this policy to a fine art. But also in South Africa a former Prime Minister is known to have expressed the view that the world must be kept guessing.

That view implied strict observance of a ban on the nuclear boast among government spokesmen, and there have been none of these for some years since the Finance Minister, Mr Owen Horwood, came close to one.

If Taiwan is included it appears that all three members of the alleged "pariah axis" are committed to bomb-in-the-basement diplomacy, especially because if there is nuclear cooperation, and one breaks the bond of silence, the others could easily be implicated.

This is, nuclear observers say, the scenario of such cooperation:

South Africa has the "gunpowder" for the bomb and the technology to make it. This would be a matter for Armscor to refine, and the Atomic Energy Board could quite correctly continue to reiterate the "peaceful purposes" of nuclear research. But South Africa still falls short in the means to deliver a nuclear device.

Israel and Taiwan need the "gunpowder" but have extensive technology to deliver the bomb, not only in aircraft and missile systems, but also in radar and anti-missile systems. To them the use of missile-prone Mirages as carriers would be primitive.

This scenario suggests that the three countries would do swops--material for technology. For all three have different needs.

South Africa, as has been said many times, has no need or use for an atomic bomb. It cannot be used against guerrillas in a border area, and its use on cities housing anti-Pretoria guerrillas is unthinkable and would risk retribution, possibly even involving a superpower. But South Africa, in a conventional war, could find good uses for a tactical nuclear shell, such as one fired from a 155 mm cannon.

Taiwan, on the other hand, thinks it has an urgent need for nuclear bombs. For if it were attacked by mainland China an armada of ships would have to be used, a perfect target for nuclear weapons.

Israel's needs, the scenario writers say, fall between those of the two other countries, with more accent on materials than technology.

Now for the great paradox.

Earlier this year the Minister of Foreign Affairs, Mr Pik Botha, threw a large spanner into all these scenarios and speculations, the bluff and counter-bluff, by announcing that the Government was "considering" signing the global agreement banning all nuclear weapons, the American-inspired Non-Proliferation Treaty.

Mr Botha was, in fact, trying to say: "We have made no atom bombs, and we promise not to make or use them. If we have made any, we will defuse them. And you can come and inspect our Valindaba plant to see whether we make any nuclear explosives there and to inspect the books which show to whom we sell enriched uranium."

It was an extraordinary statement and led to much speculation which by now has died down.

But one observer long involved with nuclear affairs told me recently: "I think Mr Botha's statement was a nuclear red herring. South Africa is in a position of strength and will never sign the Non-Proliferation Treaty.

And so the game of bluff and counterbluff continues and whatever bombs there may be they remain solidly in the basement.

South African-born nuclear strategist, Professor Jack Spence believes they would emerge only when all that is left is the "apocalyptic option."

Of all local subjects in South Africa the "Pretoria bomb" remains the most unmentionable.

CSO: 5100/2

ROLE OF KOEBERG IN POWER SCHEME DISCUSSED

Johannesburg THE STAR in English 25 Sep 82 p 7

[Article by John Bentley and James Clarke]

> [Text] The Drakensberg scheme...water from the Tugela is fed along a network of canals back to the Jager's Rust Pump Station where, instead of being pumped up through the old T'zamenkomst Tunnel, it is pumped to the lower (Kilburn) dam. The power station's underground turbines then pump water through tunnels to the upper "dam-within-a-dam," Driekloff. The process is reversed at periods of peak electricity load, when water is allowed to run down the tunnels, dropping 500 metres at 19 metres a second to turn the turbines.

Power Scheme 1--A Mountain That Pushes Out Power

A mountain that generates electricity sounds like the perfect ingredient for a modern fairy story.

Except that such a fairytale mountain already exists, right here in South Africa. And even more are in the offing according to Escom's master plan for the next few decades.

The first of these magical hillsides is on the slopes of the Drakensberg range near Olivierskoek, not far from the spectacular Amphitheatre, gathering place of the giants in local folklore.

Invisible

Water pumped uphill between two reservoirs is allowed to run down again--all through tunnels bored deep in the hillside--using gravity to generate power which takes up the overload on the national energy grid during periods of peak demand.

The enormous tunnels and turbines would have done the legendary giants proud. And the fact that the workings are virtually invisible from the surface adds to the fairytale quality of the scheme.

The brainchild of Mr Bruno Graber who heads Escom's hydroelectric section, the Drakensberg Pumped Storage, Scheme is a dual-purpose project realised in co-operation with the Department of Water Affairs.

Along with its ability to generate electrical power, it is used to pump water from Natal's Tugela River up over the 'Berg into the Sterkfontein Dam on the Orange Free State side.

South Africa is a relatively dry country with erratic rainfall, so hydroelectric power in the normal sense is not an important part of Escom's electricity-generation capacity.

There are only two conventional hydropower stations in the Escom network, at the Hendrik Verwoerd and P K le Roux dams. Their generating capacity is 540 megawatts, less than three percent of the total generated nationwide.

They are operational only when the dam levels are high enough.

Change

But pumped storage schemes will change the situation markedly over the next few years.

The Drakensberg project, with a peak generating capacity of 1,000 MW, has raised the proportion of locally generated hydropower in the system to eight percent.

Pumped storage schemes are net users of electricity, consuming more power to pump water back than they produce in the "generating mode."

Their function is to generate power during periods of peak load on the system. Pumping is then done in periods of low demand.

"In fact, it's a way of storing electricity. You could call it an 'hydraulic battery,'" says Mr Tony Holthuysen, deputy manager at Drakensberg.

The use of electricity fluctuates continuously according to consumer demand. Periods of high demand (peak load) are between 7 am and midday and during the evenings from about 6 to 10. Lowest demand is from around midday on Saturday to early on Monday morning.

Invaluable

In its first months of operation the Drakensberg scheme has proved invaluable, coming to the rescue several times when power imported from Cahora Bassa has cut off.

Plans are now under way for a similar scheme using water from the Palmiet River, a few kilometres south of Grabouw in the Cape.

The project, which could be completed by 1988, will pump water into the Steenbras reservoir, adding some 30 million cubic metres of water a year for use by the Cape Metropolitan area. Further schemes on the Tugela are also under investigation. All such "peaking plants" will have a dual function, transferring water from one dam to another and operating partly as normal hydro and partly as pump storage. An elegant way of eating your cake and still having most of it!

Power Scheme 2--The Giant That Keeps Growing

Escom, South Africa's burgeoning electricity utility, is a giant, even by world standards.

Growing at a rate which has seen it double in size over the last 10 years--following similar performances in each of the two preceding decades--the national supplier of electricity currently ranks with the third-biggest utility in the US.

And this spectacular growth pattern is to continue, with one complete new 3,600 MW coal-fired power station scheduled for completion each year from 1985 up to the end of the century.

There is also the possibility of more hydro-electric pump-storage schemes to follow the recently completed Drakensberg project and the Palmier scheme in the Cape, as well as more nuclear stations to follow Koeberg, should the economics justify such a step.

The present rate of expansion--8.8 percent a year--is over twice the annual national increase in demand for energy.

But, points out Escom's chief engineer (system planning), Mr Bruce Norman, electricity is supplying an ever-increasing proportion of South Africa's energy needs.

The trend is a logical one, Mr Norman says. "Electricity is one of the most useful and efficient forms of power. It is flexible and can be used in almost any application."

These properties mean electricity is playing an important part in efforts to decrease the country's dependence on oil.

South African Railways is converting from diesel to electric locomotives. Country towns which used to produce their own power with diesel-fired generators are turning to Escom. Mines are replacing diesel vehicles with electrically driven versions.

The network of electrical power is continually spreading, supplying more rural areas and the national states, such as Transkei, Bophuthatswana and Venda.

Projects like the electrification of Soweto will increase demand still further.

The growth in demand for electricity will continue at a higher level than the overall increase in demand for power for many years to come.

"We expect it to tail off from the present increase of 7.8 percent a year to 6.6 percent by the year 2000, dropping to 4.5 percent by 2050," Mr Norman says.

The new generation of coal-fired power stations will be the backbone of Escom's "baseload" plant for the foreseeable future.

Sited in the Eastern Transvaal coalfields, they are gradually transforming the vast, flat skyline with their tall chimneys and curved cooling towers.

The sixth and last of the giant 600 MW sets that make up the Matla power station will be commissioned next year. Another giant, Duvha, currently has four sets commissioned. The final two will be operating by 1984.

Then will follow the Tutuka station near Standerton, and after that a series of names which by their ring evoke sensations of mysterious power and might: Lethabo, Matimba, Khutala, Majuba, Lekwe...

All will be 3,600 MW stations, made up of 600 MW units, though 900 MW and even 1,300 MW units are not ruled out for the end of the century.

An important innovation planned for several of the new giants is "dry cooling," which will cut water consumption dramatically.

The first will be at Matimba, which is to be sited in the relatively dry Ellisras area. The technology is well proven--Escom has run dry-cooling on 200 MW sets at Grootvlei. But the scale will be totally new: there are no other 600 MW dry-cooled sets in existence.

"Dry towers are more expensive to build, and lead to a loss of efficiency in the plant, but water savings are appreciable," says Mr Ross Hatton, manager of the conventionally-cooled Duvha station.

A conventionally cooled station loses something like 30 million litres of water a tower a day. Dry cooling cuts that figure by 64 percent...against an increase in operating and running costs of around eight percent.

There are no plans to convert conventional stations to the new system: given the 40-year life of a station, that would be uneconomic.

The dry-cooled units already approved--so far there are 12 on order--will make an appreciable difference to Escom's water consumption, currently running at about 1.8 percent of the national total.

The new coal stations will be tied into a new 800 kilovolt "supergrid," superimposed on the present 400 Kv national grid.

This will allow more economic transmission of power over long distances, allowing reinforcement of the system in Natal and the Cape.

"Overall costs are considerably cheaper, though the cost of terminal equipment is high," says Mr Norman.

Another solution to the problem of power for areas far away from the coalfields is nuclear power--and his is one of the reasons given by Escom for the decision to commission the Koeberg station in the Cape.

Koeberg's first giant 922 MW set will go on stream in 1983, the second in 1984.

There are no concrete plans for further nuclear stations within the next ten years. But Escom is fully aware that an alternative to coal will have to be found before the "coal crisis" hits South Africa. By its estimates, problems with coal supplies could begin by "around the year 2030."

The third ingredient in Escom's power formula is pumped storage.

First in a series of hydro-electric projects that will use "pumped water" to generate power during peak load periods, so easing the strain on the grid, is the Drakensberg scheme on the Tugela.

Last winter, problems with shut-offs in the supply from Cahora Bassa forced frequent load-shedding. Now, admittedly helped by a comparatively mild winter which has seen peak demands somewhat lower than expected, though still higher than last year, Escom is in a position to cope with cuts in supply.

The recently approved Palmiet pump-storage in the Cape, and possibly further schemes on the Tugela, will give even greater self-sufficiency, though they will continue to take Cahora Bassa's cheap "natural" hydro power whenever it is available.

With coal as its "anchor," nuclear energy as a supplement and possible replacement, and pumped storage to handle periods of heavy demand. South Africa's electricity giant is confident of satisfying the country's ever-growing power appetite well into the 21st century.

Power Scheme 3--Our Nuclear Christmas Present

In a few weeks' time Koeberg's number one reactor will be loaded with its French-made uranium fuel. Then, soon after the New Year, the atomic reaction will begin to heat water for the conventional steam-driven turbines and, slowly at first, power will be fed into the nation's electricity grid.

By next winter the turbines will be spinning full bore and a mere 120 tons of natural uranium will be producing as much electricity annually as 3-million tons of coal.

Not long afterwards number two reactor will be fueled up and the coalless Western Cape will be producing from its relatively small nuclear power station far more power than the huge Cahora Bassa hydro scheme on the Zambezi.

Thus far South Africa's nuclear energy scientists are satisfied. It has been expensive (Koeberg, in the final analysis, will probably have cost us R2 000 million but, economically, it has been worth it).

To have brought to the Western Cape the same amount of power via coal-fired stations would have cost a great deal more, and the environmental impacts (smoke, water pollution from mining, power lines) would have been enormous.

Will there be more Koeberg-style light water reactors soon?

Not this century, according to an Escom spokesman. But says the President of the Atomic Energy Board, Mr Wynand de Villiers: "A nuclear development plan is essential."

There is really only one viable alternative to going increasingly nuclear: to import hydro-electricity from Zaire which on one bend in the Zaire River, could supply us with many times more power than we will probably ever need. In fact the potential site is nearer to Cape Town than Cahora Bassa is to the Rand.

But the political instability of Central Africa makes it an impossible dream.

What of other alternatives?

--Coal: We have enormous reserves (110 000 million tons are economically extractable which, at present extraction rates, would last nearly 1 000 years) but coal is increasingly being looked upon as a multiple-use chemical. It can be broken down into oil for a start and could, potentially, make us independent of oil imports.

--Hydro: The Orange River's two hydro schemes supply just over half the equivalent of a single reactor at Koeberg (540 MW) but are used only as reserve for peak loads or emergencies. The Drakensberg pumped storage scheme supplies 1 000 MW but, again, is for peak load times. The Tugela has a fair amount of latent energy but, all told, hydroelectricity is unlikely to supply more than, say, eight percent of our requirements over the next half century.

--Solar power: Although the sun's direct power could bring electricity to remote areas and supply a third of the power needs of houses in South Africa, it is unlikely to make significant contributions to the overall energy picture.

Solar power is potentially of importance in bringing down the cost of living for suburban dwellers (via roof collectors to heat water) and farms. It is grossly starved of research funds according to solar energy scientists. It requires a minimum of 30 researchers and R20 million a year--it gets about $500 000 and has three researchers.

--Wind power has some interesting possibilities. For generations South Africa has used it for pumping water. Research in South Africa but mostly outside indicates windmill generators could play a useful supplementary localised role.

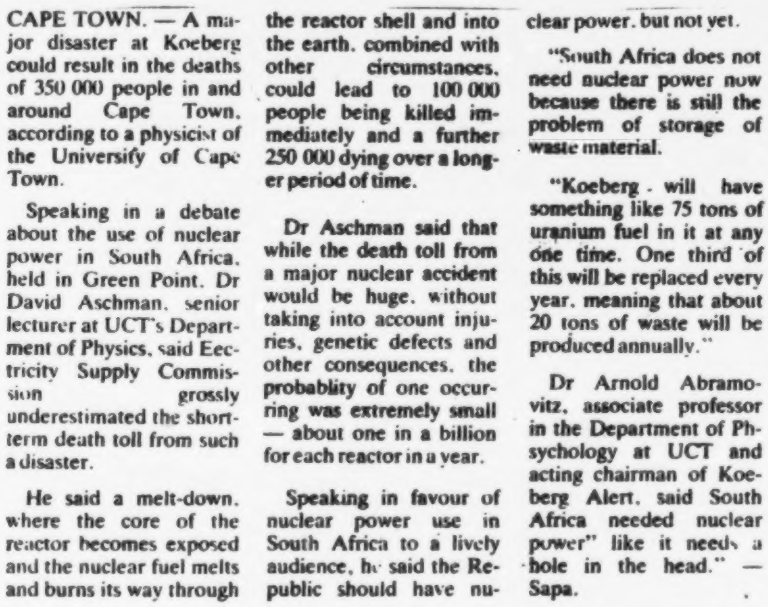
--Conservation if industry and commercial buildings were designed to be energy efficient it should be possible to save as much as half the energy required by buildings and a quarter by industry. The way car engines were modified after the oil crisis, thus dramatically reducing oil consumption, has shown what can be done when the need is there.

CSO: 5100/2

PHYSICIST REPORTS ON THREAT OF KOEBERG MELT-DOWN

Johannesburg THE CITIZEN in English 8 Oct 82 p 11

[Text]



CAPE TOWN. — A major disaster at Koeberg could result in the deaths of 350 000 people in and around Cape Town, according to a physicist of the University of Cape Town.

Speaking in a debate about the use of nuclear power in South Africa, held in Green Point. Dr David Aschman, senior lecturer at UCT's Department of Physics, said Eectricity Supply Commission grossly underestimated the short-term death toll from such a disaster.

He said a melt-down, where the core of the reactor becomes exposed and the nuclear fuel melts and burns its way through the reactor shell and into the earth, combined with other circumstances, could lead to 100 000 people being killed immediately and a further 250 000 dying over a longer period of time.

Dr Aschman said that while the death toll from a major nuclear accident would be huge, without taking into account injuries, genetic defects and other consequences, the probablity of one occurring was extremely small — about one in a billion for each reactor in a year.

Speaking in favour of nuclear power use in South Africa to a lively audience, he said the Republic should have nuclear power, but not yet.

"South Africa does not need nuclear power now because there is still the problem of storage of waste material.

"Koeberg will have something like 75 tons of uranium fuel in it at any one time. One third of this will be replaced every year, meaning that about 20 tons of waste will be produced annually."

Dr Arnold Abramovitz, associate professor in the Department of Phsychology at UCT and acting chairman of Koeberg Alert, said South Africa needed nuclear power" like it needs a hole in the head." — Sapa.

CSO: 5100/1

BRIEFS

FAITH IN NUCLEAR POWER--Cape Town--Foreign countries now realise that the Republic's uranium enrichment process is South African and is successful, the managing director of the Uranium Enrichment Corporation, Dr Wally Grant, says. Speaking at the Stellenbosch branch of the Akademie Vir Wetenskap en Kuns, Dr Grant said political pressure had almost destroyed cooperation between South Africa and overseas countries in the field of nuclear power. He said the provision of nuclear power fuel remained a problem. As the demand for electricity increased, nuclear energy would probably have to be used to a greater extent. South Africa and countries abroad had an enormous trust in nuclear power, Dr Grant said. [Text] [Johannesburg THE CITIZEN in English 9 Oct 82 p 9]

CSO: 5100/2

NEW EFFORT UNDERWAY TO EXPORT NUCLEAR TECHNOLOGY

Paris LES ECHOS in French 1 Sep 82 p 6

[Article by Didier Duruy]

[Text] India, China, Belgium: France's involvement in nuclear power programs now extends in all directions. It is true that the need to export has never been quite so urgent as it is now. It would actually come as a great surprise if the government were to authorize EDF [French Electric Company] to begin work on more than five nuclear units in 1984-1985. And even in this list, one reactor would only be there on an optional basis.

The new phase of France's nuclear program will be determined toward the end of this year, once the first conclusions of the energy planning commission have been released. This commission has replaced the now defunct PEON [Advisory Commission on the Production of Electricity from Nuclear Sources] commission.

As a consequence, it is time for French industry to try to move outside France to collect the dividends of its earlier programs and technological efforts. This is a difficult job, and one at which our industry does not excel. The economic crisis and the oil glut, even if it is only temporary, are slowing down investment in energy programs. Moreover, the financial crisis does not favor nuclear energy, which gobbles up investments.

This means there will be problems with exports and a slowdown in French electricity demand.

However, there is still one solution: to sell nuclear kWh abroad. Switzerland, Italy, the Netherlands, and Spain, to mention only the most interested countries, are potential buyers.

But this can only happen if the appropriate political decision is made.

Why not try this? Nuclear energy is an excellent example of an advanced technology mastered from A to Z by our industry and government organizations. Such key sectors are not so numerous that we can afford to let such an opportunity slip through our fingers. Jean-Pierre Chevenement is convinced of this. He views nuclear energy is a field which can be an excellent source of jobs.

Sensitive Cooperation with Belgium

Etienne Knoops, the Belgian minister of energy, will meet in Paris tomorrow with his counterpart, Edmond Herve. On the agenda are Belgium's participation in the construction of the Chooz nuclear power plant in the Ardennes, and more generally, the establishment of cooperation between the nuclear power industries of the two countries.

The creation of a "balanced" form of cooperation, which was stated as a goal last February during a previous meeting of the two ministers, actually depends largely on the Belgian nuclear program. And on this point, the situation is far from clear, and will not be so at best before October, after a new senate debate.

Reciprocity and balance do imply Belgium's participation in Chooz, but also a French contribution to Doel 5, Belgium's future nuclear power plant.

Not yet knowing when this new project will be begun (there is talk of first going back to coal), it is hard to draw up a plan for cooperation. But time is pressing, at least on this side of the border.

The electricity exchanges also contained in the cooperation program are no further advanced. There are some differences of opinion remaining between the private Belgian companies and EDF about the price of this electricity.

All things considered, it will be more difficult to reproduce with Chooz and Doel the program established between Paris and Brussels some years ago for the first nuclear power plant at Chooz and at Tihange, on the other side of the Quievrain.

The new environmental movement which has swept Belgium in response to the affair of the wastes dumped off the coast of Spain (a train transporting wastes to the port of Zeebrugge was stopped) also threatens to delay matters.

France Again Gains a Foothold in China

A Chinese scientific mission is expected to come to Paris at the end of September, at the invitation of the CEA [Atomic Energy Commission]. The discussions will focus on technology transfers which can be made from French industry to Chinese enterprises. The principle of this meeting was approved during last week's visit of a delegation of high-level French officials to China.

The members of this delegation (representatives of the ministries of foreign trade, foreign affairs, industry, and the economy, along with the CEA) were primarily concerned about "gaining a foothold in China" through this visit.

While the statements made by Chinese officials at the end of last year were interpreted in France as a definite abandoning of any nuclear ambitions, the Americans and British pursued their dealings with the Canton Electricity Company. Consequently, it was time to let the Chinese know that French industry would still be ready to build a power plant consisting of two reactors, each with a 900-MW capacity.

The visit of the French delegation did let us get a better idea of the Chinese intentions, though we must realize that no movement in this process can be expected overnight--"perhaps in 6 months," one member of the delegation told us. It has now been agreed that a joint company will be set up to operate this plant. The local electricity company will hold 60 percent, with the balance held by the China Light and Power Company of Hong Kong.

We must also realize that the construction of this nuclear power plant will only become a reality if the neighboring British colony of Hong Kong supports the project. Peking is not able to finance the plant on its own. Hong Kong does need electricity and is reportedly prepared to buy from 50 to 60 percent of the electricity produced by the Cantonese plant, thus providing financial backing.

In addition, a long term agreement would protect the future of the British colony beyond the fateful date of 1997, when the Sino-British renegotiation of the status of Hong Kong is to take place.

Technology Transfers

But we haven't won the game yet. We will have to learn the price that Sir Lawrence, the president of the China Light and

Power Company, will agree to pay for electricity from Canton. The Chinese have proven their ability as skilled legotiators, and should be able to play off the French, Americans, and British against each other to raise the bids.

Peking has no intention of continuing to purchase power plants from foreign countries indefinitely (its finances wouldn't allow it to do so, at any rate). Consequently, it wants its technicians to be involved in the construction of the Canton power plant. Such a project therefore includes a technology transfer, which will be discussed in Paris this month.

In this matter, the French government has taken the bull by the horns and is out in front. Private industrialists were also present in China during the visit of this delegation, but were acting there on their own initiative.

At a time when people in France are still trying to find the best structure for favoring nuclear exports, this desire to discuss government-to-government may well cause some grumbling.

This is especially true as the Chinese would like EDF to take part in this project. And for the conventional part of the plant, they would also like to have a joint Franco-British bid, with Alsthom-Atlantique and General Electric working in association. But the French officials have opposed this.

French companies, which have been making contacts with foreign markets in a pragmatic way for several months now, do have time to get organized. Especially as, even in Peking, nuclear energy isn't supported by everyone.

More information should be available after Mrs Thatcher's visit to China and Hong Kong.

Controls Affecting Relations with India

The Franco-Indian negotiations on the delivery of enriched uranium will be no picnic. The mission was to be led by the director general of COGEMA [Nuclear Materials Company]. He has just postponed his departure for New Delhi to a later date. The Indian press is sharply criticizing the demands being made by the French.

The postponement of the meetings is not officially motivated. Authorized sources report that during August, Paris apparently demanded more extensive controls. This would tend to prove that France has maintained a certain continuity in its approach to the dangers of proliferation, in spite of political changes.

(To date, the attitude of our leaders on nuclear exports has been shrouded in secrecy). In any event, New Delhi reportedly rejected the French plan, so that there is now no reason for the commercial and financial negotiations which Mr de Wissocq was to have begun, at least for the time being. The contract involves about 40 million francs.

The reader will recall that France intervened in this matter at the joint request of Mrs Gandhi and President Reagan. The entire operation could be in danger, if we are to believe the Indian press. According to our colleagues, the Gandhi government might put in the balance the weight of some purchases it has made from French industry, such as the Mirage 2000 aircraft.

In Paris, though, people are still optimistic about the chances of reaching an agreement with New Delhi in the more or less long term. Perhaps the upcoming conference of the International Atomic Energy Agency may afford a chance to renew contacts.

7679
CSO: 5100/2256

SAINT-LAURENT-B PLANT HAS MECHANICAL PROBLEMS

Paris LES ECHOS in French 9 Sep 82 p 13

[Article by Didier Boret]

[Text] The Saint-Laurent-B nuclear power plant has had a long series of problems. The first nuclear power plant at Saint-Laurent-des-Eaux, located on a loop of the Loire river, was without a doubt a great success for French technology.

After the experimental phase at Chinon, Saint-Laurent-A demonstrated the capability to use a totally French system (natural uranium-graphite-gas) to produce electricity. The first 500-MW unit went on line in 1969, and the second in 1971. Incidents did occur, as they do in any industrial facility, but it is generally agreed that this plant is operating well, in good safety conditions, and that it has made a significant contribution to the French electric power system.

The first steps taken on the second plant--Saint-Laurent-B-- are clearly more faltering, if we are to judge by the many shutdowns since the two units (each 900 MW) went on line in January and June 1981. It isn't actually the nuclear technology itself which is causing the problems, but rather the secondary part (the turboalternator and related equipment), which is being used at Saint-Laurent-B for the first time. The new equipment, particularly the dryers, steam superheaters, have had some anomalies which have caused shutdowns, repairs, and operation at reduced power until there can be certainty about the good behavior of the equipment. Defects have been reported on some seal rings, which could cause some of the valves to crack.

Quite recently, the plant's directors announced a 3-month shutdown of both units in order to examine the alternator rotor, because an anomaly was found on an identical piece of equipment at the Chinon-B plant.

Saint-Laurent-B to date has hardly contributed to the nation's power supply.

The CFDT [French Democratic Confederation of Labor], criticizing these failures, has pointed out that since this plant went on line, it has actually operated for the equivalent of only 53 days.

7679
CSO: 5100/2256

BRIEFS

NUCLEAR PLANT FOR CHINA--Last weekend a French mission composed of six people arrived in Peking to discuss the project to have France build a nuclear power plant in southern China. The delegation, led by Mr Chahid-Nourai, a staff director at the ministry of foreign trade, was made up of representatives from the ministry of foreign affairs and staff members of the CEA [Atomic Energy Commission]. French sources reported that this delegation came to examine China's overall intentions about nuclear power, and also to discuss France's capabilities in this area. The plant which France is proposing to build for China would have a power of 900 MW and would be built in the province of Canton. British, Japanese, and American companies have also expressed an interest in this project, which would supply electricity to Hong Kong. [Text] [Paris LES ECHOS in French 23 Aug 82 p 6] 7679

CSO: 5100/2256 END

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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 170

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29 November 1982

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 170

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GOVERNMENT ACTS ON PLANS FOR URANIUM ENRICHMENT SITE

Details of Decision

Canberra THE AUSTRALIAN in English 7 Oct 82 p 1

[Text]

THE Federal Government yesterday took a big step towards setting up a uranium enrichment industry, to cost at least $1000 million, either in South Australia or Queensland.

In a series of moves which immediately sparked controversy, the Government:

NARROWED down the choice of a site of an enrichment plant to either Adelaide or Brisbane.

ACCEPTED gas centrifuge technology, developed by a European consortium, Urenco-Centec, as the basis for a plant, which could treble the value of our yellowcake.

APPROVED further studies by the consortium into the feasibility of the plant.

APPROVED the project under the foreign investment guidelines providing for 50 percent foreign equity and Australian control of the plant.

The Government's decision came three days after the Victorian branch of the Labor Party demanded that a special national ALP conference be held to toughen the party's stand on the mining, export or processing of uranium.

It ensures that the uranium debate will continue to flare between now and the next federal election.

The decision was attacked by the ALP, which opposes the establishment in Australia of nuclear power plants and other stages of the nuclear fuel cycle, including enrichment.

The Opposition spokesman on the environment, Mr Stewart West, said a Labor Government would halt the project.

The Minister for Trade and Resources, Mr Anthony, and the Minister for National Development and Energy, Senator Sir John Carrick, said the Government's decision followed a recommendation by the Uranium Enrichment Group of Australia.

The group, comprising four big resource development companies, BHP, CSR, Peko Wallsend and Western Mining, has invested $5 million in a pre-feasibility study.

It has made recommendations to the Government on the choice of technology, site selection, market opportunities and the nature and timing of further work.

The group recommended the gas-centrifuge technology pioneered by Urenco-Centec, a consortium of which West Germany, Britain and the Netherlands are members.

Urenco sources in the Netherlands told *The Australian* earlier this year the company hoped to welcome Australia as a full partner by the mid-1980s, offering it access to its high technology.

Factors identified by the Australian companies in support of the Urenco technology included economic superiority, proven technical and commercial capability and flexibility for modular growth.

The Government also accepted the companies' recommendation that sites near Adelaide and Brisbane be evaluated further as they were most likely to satisfy the requirements of a plant based on the Urenco-CEntec technology.

The Treasurer, Mr Howard, said that under the Government's foreign investment policy, uranium enrichment was not covered by the 75 per cent Australian equity applying to new uranium mining projects.

Mr West ridiculed the project, saying there would be a substantial world surplus of enriched uranium for years to come.

Reprocessing

He also said the Government could not consider an enrichment plant without the establishment of a gasification plant, the second stage in the nuclear fuel cycle.

"The next step would be for a nuclear power station in Australia which would lead us into problems of waste disposal and inevitably reprocessing," he said.

"I am convinced that that is not what a majority of Australians desires."

The Friends of the Earth movement said last night the Government's decision showed a dangerous lack of realism.

Its spokesman, Mr John Hallam, said in Melbourne the Government had been pursuing a uranium enrichment fantasy ever since 1975.

The South Australian Premier, Mr Tonkin, yesterday pressed his State's case for having the enrichment plant.

He said South Australia was well-placed because it was the first to advocate use of the technology and had established strong links with the consortium.

"We can offer access to major deposits of uranium at Honeymoon, Beverley and Roxby Downs, and a central location for the processing of uranium from other parts of Australia," Mr Tonkin said.

[Editor's Note: In its report on the government action, Melbourne THE AGE on 7 October, page 1, said: "A Queensland Department of Works spokesman named a 200 to 400-hectare area between Boonah and Beaudesert, 56 kilometres south of Brisbane, and an area north of the city as sites being considered. A Government spokesman refused to give details on possible South Australian sites."

Brisbane's THE COURIER-MAIL of 7 October, page 5, reported that "Two sites in Queensland are being considered for the plant. A Queensland Works Department spokesman said one was between Boonah and Beaudesert. The other was near Caboolture."

Brisbane Site Controversy

Brisbane THE COURIER-MAIL in English 8 Oct 82 p 5

[Article by Bill Ord]

[Text]

REPORTS that a billion dollar uranium enrichment plant to produce nuclear power fuel could be built within 60 km of Brisbane, near Beaudesert or Caboolture, raised protests yesterday.

The Federal Government has announced its approval of plans by the Uranium Enrichment Group of Australia — made up of CSR Ltd, BHP, Western Mining Corporation and Peko Wallsend — to build a uranium enrichment plant costing more than $1000 million. It would have up to 50 percent foreign ownership.

The group said it had its eye on the two Queensland sites, and another in South Australia.

The Ipswich Mayor, Alderman Freeman, said: "We don't want the thing in Australia, let alone in Queensland — and smack-bang close to the state's most densely populated area, at that."

The Caboolture Shire chairman, Cr Barr, said: "It's unreal to think of establishing such a plant in or near a big centre of population, and it wouldn't do a thing for our relaxed lifestyle."

The Caboolture Ratepayers and Citizens' Association spokesman, Mr Keith Chisholm, said he believed a plant would not blend with the area's projected urban growth.

"I think if we look 20 or 30 years ahead, Caboolture will be a bit like Aspley as an outer-type suburb for Brisbane," he said.

The Beaudesert Shire chairman, Cr Struss, said: "It just isn't our thing. I know very little about uranium enrichment and its hazards — or advantages, if there are any — but it doesn't sound like good news to me and, from the way my telephone's been running hot, the people of the shire feel the same way."

Brisbane's Lord Mayor, Alderman Harvey, could not be reached, but his deputy, Alderman Ardill, said recently that Brisbane City Council would mobilise public opinion against any nuclear plant in or near the city.

The Queensland Campaign Against Nuclear Power chairman, Mr Bruce Doyle, said the plant would subject Australia and south-east Queensland to unnecessary dangers.

The Premier, Mr Bjelke-Petersen, said: "I've always advocated the further processing of uranium in Queensland. The government put up a strong case for a nuclear enrichment plant to be established here.

"It's the logical thing to do because of our closeness to the uranium mines and our ample power resources."

The National Development and Energy Minister, Senator Sir John Carrick, said the Government had accepted the group's recommendation that a centrifuge enrichment technology developed by a British-Dutch-West German nuclear consortium be used in the Australian plant.

In this process, yellowcake uranium oxide — the basic nuclear material produced by Australia's uranium mines — is first concentrated into uranium hexafloride, a solid which readily becomes a gas known as UF6 or "hex."

Hex is injected into centrifuges spinning at very high speed which separate heavier U238 atoms from lighter U235 atoms, the basic material for nuclear fuel, which comprise about 0.7 percent of yellowcake's volume.

The U235 material is sent through a long succession of centrifuges until the proportion of U235 is increased to about 3 percent.

This enriched material is converted into small pellets which are loaded into alloy tubes for use as nuclear reactor fuel.

Democrats', ALP Condemnation

Melbourne THE AGE in English 8 Oct 82 p 4

[Text]

CANBERRA. — The Federal Government's planned uranium enrichment plant ought to be an issue at the next Federal election, the Deputy Prime Minister, Mr Anthony, said yesterday.

Mr Anthony said the likelihood that a Labor Government would close the uranium industry down was one of the factorfs to be considered when people voted at the election. He said a uranium enrichment industry would provide a "major boost to national development and employment".

Mr Anthony said peole living near possible sites for an enrichment plant — including one only 60 kilometres from Brisbane — had nothing to fear.

"There are a lot of communities around Australia that would welcome having such a big manufacturing processing plant nearby to give employment opportunities for their people," he said.

The Australian Democrats joined the Labor Party yesterday in condemning the Government's moves toward establishing a uranium enrichment industry.

Senator Siddons said it was beyond understanding that the Government should encourage a billion dollar uranium enrchment project when scarce resources could be put into "efficient and socially desirable labor-intensive or energy consrving industries".

CSO: 5100/7508

RESISTANCE FORMS IN QUEENSLAND TO URANIUM ENRICHMENT PLANT

Caboolture Opinion Survey

Brisbane THE COURIER-MAIL in English 12 Oct 82 p 14

[Article by Bill Ord]

[Text] Nearly 90 percent of Caboolture residents were against the establishment of a nuclear-enrichment plant in the area, the Campaign Against Nuclear Power said yesterday.

It was announced from Canberra last week that the Federal Government had agreed to the location of a giant $1000 million plant near either Caboolture or Beaudesert in Queensland or at a South Australian site.

CANP's Queensland branch president, Mr Bruce Doyle, said the organisation conducted a public-opinion survey at Caboolture last weekend.

The result was: 88 percent against the plant, 5 percent in favor and the rest undecided.

He said that when asked whether they wanted a plant anywhere in Australia, 73 percent said "no" and 13 percent said "yes".

Trade Union Position

Brisbane THE COURIER-MAIL in English 13 Oct 82 p 30

[Text]

THE Queensland trade union movement would resist any move to build or operate a uranium enrichment plant in Queensland, the Trades and Labor Council assistant general secretary, Mr Ray Dempsey, said yesterday.

He said: "On behalf of the Australian Labor Party, I want to issue a warning to anyone who is contemplating investing in the proposed nuclear enrichment plant not to waste their money."

Even if the plant was built despite union action, the trade union movement was influential in the ALP and the unions would argue very strongly for operations at the plant to cease, Mr Dempsey said.

The Queensland Tram and Bus Union state secretary, Mr Tom McHenry, yesterday called on the TLC to sponsor a seminar on the proposed enrichment plant.

The union also called on the TLC to take whatever other action it considered necessary.

Mr McHenry said: "We are alarmed at the prospect of a uranium enrichment plant being built near Brisbane or anywhere else in Queensland." The ALP had undertaken that there would be no further contracts for uranium from Australia when the existing contracts ended.

He said: "We believe the spending of billions of dollars to build such a complex would make it difficult for the ALP to maintain its policy on uranium.

"It would be disastrous for the trade union movement to allow the syphoning of billions of dollars to such a project that would create very little employment in Australia.

"The money would be better spent in job creation industries," Mr McHenry said.

Mr Kruger (ALP, Murrumba) said a report that Caboolture was being considered as one possible site for a uranium enrichment plant was yet another attempt to establish industry incompatible with the area.

Mr Kruger said it appeared people in "Government circles" were desperately trying to locate industries around Caboolture and Bribie Island which were not proved to be suitable, such as a coal-loading port and a pulp mill.

But a uranium plant was the most unacceptable and it could not tie in with the environment, he said.

He said: "Redcliffe, Caboolture and Bribie are fast growing urban areas which are close to Brisbane. To have such a dangerous industry so close to the state's major population area is ridiculous. We don't want it."

Queensland badly needed a comprehensive land use study. Even then a uranium plant would not find a spot in the state, he said.

Sites at Caboolture, Beaudesert and in South Australia are under consideration by the Uranium Enrichment Group of Australia for a $1 billion plant to produce nuclear power fuel.

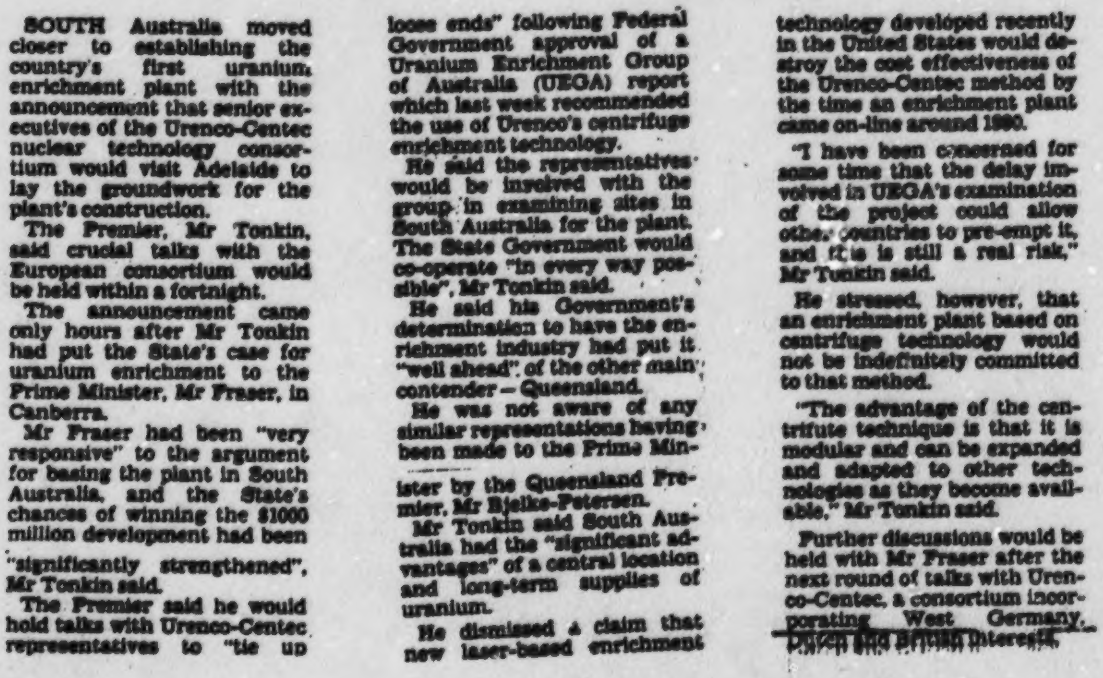
CSO: 5100/7508

SOUTH MOVES AHEAD WITH STUDY ON URANIUM ENRICHMENT

Canberra THE AUSTRALIAN in English 12 Oct 82 p 32

[Article by John Stanton]

[Text]



SOUTH Australia moved closer to establishing the country's first uranium enrichment plant with the announcement that senior executives of the Urenco-Centec nuclear technology consortium would visit Adelaide to lay the groundwork for the plant's construction.

The Premier, Mr Tonkin, said crucial talks with the European consortium would be held within a fortnight.

The announcement came only hours after Mr Tonkin had put the State's case for uranium enrichment to the Prime Minister, Mr Fraser, in Canberra.

Mr Fraser had been "very responsive" to the argument for basing the plant in South Australia, and the State's chances of winning the $1000 million development had been "significantly strengthened", Mr Tonkin said.

The Premier said he would hold talks with Urenco-Centec representatives to "tie up loose ends" following Federal Government approval of a Uranium Enrichment Group of Australia (UEGA) report which last week recommended the use of Urenco's centrifuge enrichment technology.

He said the representatives would be involved with the group in examining sites in South Australia for the plant. The State Government would co-operate "in every way possible", Mr Tonkin said.

He said his Government's determination to have the enrichment industry had put it "well ahead" of the other main contender — Queensland.

He was not aware of any similar representations having been made to the Prime Minister by the Queensland Premier, Mr Bjelke-Petersen.

Mr Tonkin said South Australia had the "significant advantages" of a central location and long-term supplies of uranium.

He dismissed a claim that new laser-based enrichment technology developed recently in the United States would destroy the cost effectiveness of the Urenco-Centec method by the time an enrichment plant came on-line around 1990.

"I have been concerned for some time that the delay involved in UEGA's examination of the project could allow other countries to pre-empt it, and this is still a real risk," Mr Tonkin said.

He stressed, however, that an enrichment plant based on centrifuge technology would not be indefinitely committed to that method.

"The advantage of the centrifute technique is that it is modular and can be expanded and adapted to other technologies as they become available," Mr Tonkin said.

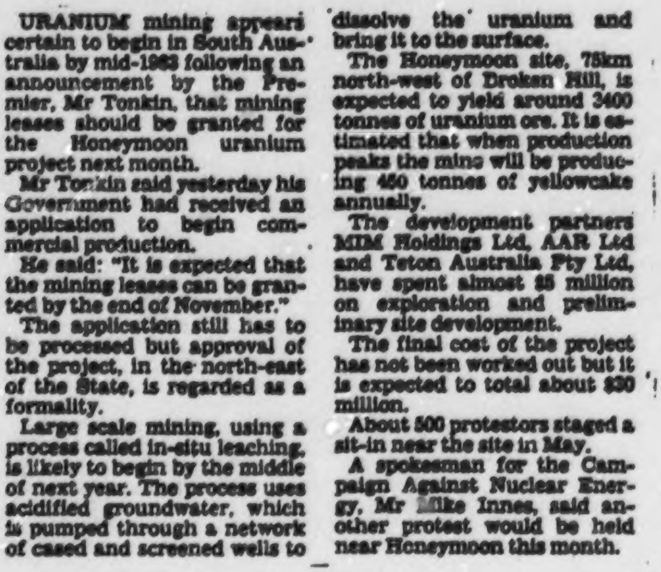
Further discussions would be held with Mr Fraser after the next round of talks with Urenco-Centec, a consortium incorporating West Germany, Dutch and British interests.

CSO: 5100/7508

SOUTH AUSTRALIA TO OK LEASES FOR HONEYMOON URANIUM MINE

Canberra THE AUSTRALIAN in English 7 Oct 82 p 1

[Text]



URANIUM mining appears certain to begin in South Australia by mid-1983 following an announcement by the Premier, Mr Tonkin, that mining leases should be granted for the Honeymoon uranium project next month.

Mr Tonkin said yesterday his Government had received an application to begin commercial production.

He said: "It is expected that the mining leases can be granted by the end of November."

The application still has to be processed but approval of the project, in the north-east of the State, is regarded as a formality.

Large scale mining, using a process called in-situ leaching, is likely to begin by the middle of next year. The process uses acidified groundwater, which is pumped through a network of cased and screened wells to dissolve the uranium and bring it to the surface.

The Honeymoon site, 75km north-west of Broken Hill, is expected to yield around 3400 tonnes of uranium ore. It is estimated that when production peaks the mine will be producing 450 tonnes of yellowcake annually.

The development partners MIM Holdings Ltd, AAR Ltd and Teton Australia Pty Ltd, have spent almost $5 million on exploration and preliminary site development.

The final cost of the project has not been worked out but it is expected to total about $30 million.

About 500 protestors staged a sit-in near the site in May.

A spokesman for the Campaign Against Nuclear Energy, Mr Mike Innes, said another protest would be held near Honeymoon this month.

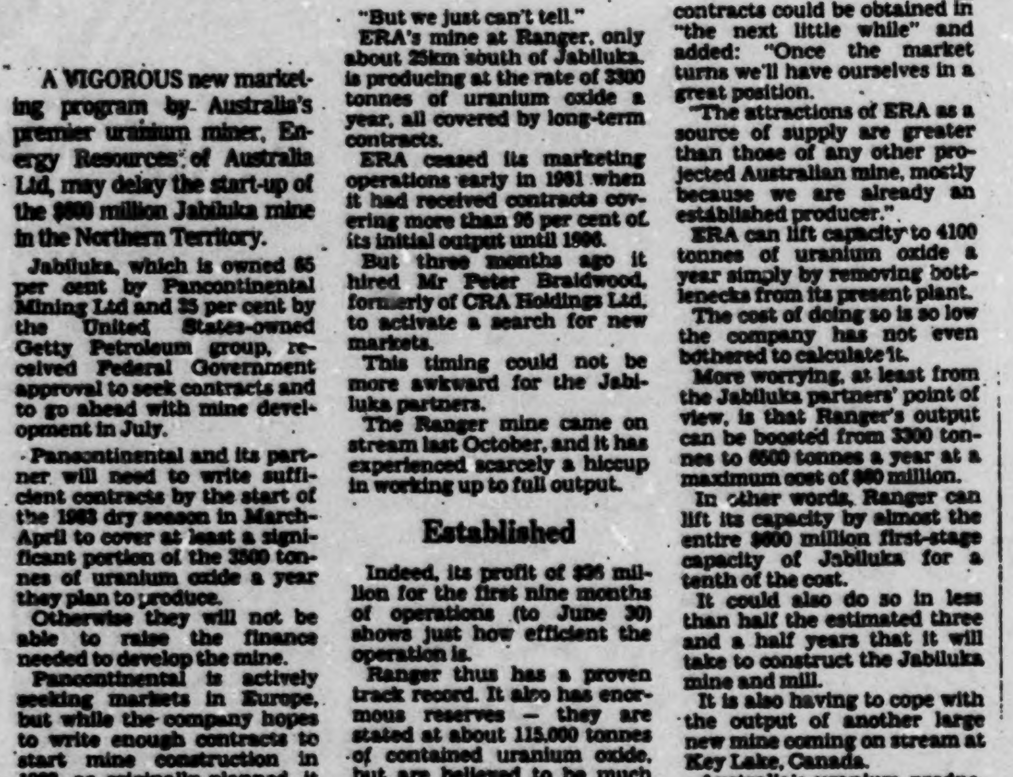
CSO: 5100/7509

REVIEW OF URANIUM MINING, MARKETING DEVELOPMENTS

Canberra THE AUSTRALIAN in English 7 Oct 82 p 15

[Article by Don Kirkwood]

[Text]



A VIGOROUS new marketing program by Australia's premier uranium miner, Energy Resources of Australia Ltd, may delay the start-up of the $800 million Jabiluka mine in the Northern Territory.

Jabiluka, which is owned 65 per cent by Pancontinental Mining Ltd and 35 per cent by the United States-owned Getty Petroleum group, received Federal Government approval to seek contracts and to go ahead with mine development in July.

Pancontinental and its partner will need to write sufficient contracts by the start of the 1983 dry season in March-April to cover at least a significant portion of the 3500 tonnes of uranium oxide a year they plan to produce.

Otherwise they will not be able to raise the finance needed to develop the mine.

Pancontinental is actively seeking markets in Europe, but while the company hopes to write enough contracts to start mine construction in 1983, as originally planned, it may not be able to do so.

"We have a good opportunity to get contracts together to be able to start construction next year," Pancontinental chairman, Mr A.J. Grey, said yesterday.

"But we just can't tell."

ERA's mine at Ranger, only about 25km south of Jabiluka, is producing at the rate of 3300 tonnes of uranium oxide a year, all covered by long-term contracts.

ERA ceased its marketing operations early in 1981 when it had received contracts covering more than 96 per cent of its initial output until 1996.

But three months ago it hired Mr Peter Braidwood, formerly of CRA Holdings Ltd, to activate a search for new markets.

This timing could not be more awkward for the Jabiluka partners.

The Ranger mine came on stream last October, and it has experienced scarcely a hiccup in working up to full output.

Established

Indeed, its profit of $96 million for the first nine months of operations (to June 30) shows just how efficient the operation is.

Ranger thus has a proven track record. It also has enormous reserves — they are stated at about 115,000 tonnes of contained uranium oxide, but are believed to be much larger — and it can easily, and inexpensively, lift output.

It has obtained "expressions of interest" in further long-term contracts from the US and Europe.

Mr Braidwood said further contracts could be obtained in "the next little while" and added: "Once the market turns we'll have ourselves in a great position.

"The attractions of ERA as a source of supply are greater than those of any other projected Australian mine, mostly because we are already an established producer."

ERA can lift capacity to 4100 tonnes of uranium oxide a year simply by removing bottlenecks from its present plant.

The cost of doing so is so low the company has not even bothered to calculate it.

More worrying, at least from the Jabiluka partners' point of view, is that Ranger's output can be boosted from 3300 tonnes to 6500 tonnes a year at a maximum cost of $80 million.

In other words, Ranger can lift its capacity by almost the entire $800 million first-stage capacity of Jabiluka for a tenth of the cost.

It could also do so in less than half the estimated three and a half years that it will take to construct the Jabiluka mine and mill.

It is also having to cope with the output of another large new mine coming on stream at Key Lake, Canada.

Australia's uranium producers have to satisfy the Federal Government as to a floor price, believed to be about $30 a lb of uranium oxide.

The Canadian producers operate under no such constraint.

CSO: 5100/7509

CLEAN-UP PROCEDURE AT MARY KATHLEEN URANIUM MINE DISCUSSED

Melbourne THE AGE in English 9 Oct 82 p 13

[Article by David Uren]

[Text]

The manager of the Mary Kathleen uranium mine, Terry Ward, has a party trick. He cups his hand under the outlet of a bore, sunk to catch liquid seeping from the uranium tailings dam and takes a long drink.

"We don't glow in the dark, it is perfectly safe," he told journalists invited by the company to tour its operations. The Australian uranium industry has a lot vested in that assurance.

The last drum of uranium yellowcake is due to emerge from the treatment plant on Friday and the company has embarked upon a controversial course of rehabilitating the plant and the mine site.

The most dangerous part of a uranium mine is the tailings pond where sulphuric acid is stored after it has been used in the uranium treatment plant. The acid still contains about 12 per cent of the uranium, along with other dangerous elements.

After the Rum Jungle uranium mine was closed in 1971, leakages from the tailings dam killed all fish and other aquatic life in the East Finnis River for a distance of 10 kilometres. Pandanus palms lining the waterway died and reeds and water-lilies disappeared.

A letter from the chairman of the Federal Government's Uranium Advisory Council, Mr L. R. McIntyre, to the Trade and Resources Minister, Mr Anthony, two years ago said: "The council is concerned that another Rum Jungle situation should not occur at Mary Kathleen."

Mr McIntyre said there were operational problems at the mine, and he drew the Minister's attention to seepage from the tailings ponds, which he said the company was concerned about and was trying to contain. The engineers at Mary Kathleen now believe they can turn those problems to their advantage.

The usual procedure for uranium mine closures overseas is to neutralise the acid by pouring lime into the tailings pond. The liquid is then drained and the tailings left are covered with more lime and clay, to stop water getting in or poisonous radon gas from getting out.

Terry Ward and his advising engineers believe the rock and soil structure of the Mary Kathleen region enable them to deviate from the normal procedure. Instead of neutralising the liquid from the tailings pond with lime, which company officials say would have cost about $5 million, Mary Kathleen has dug some deep trenches and is simply pouring the poisonous liquid into the ground.

When seepage from the tailings pond was recognised as a problem several years ago, the company sank bores to pump the escaping liquid back into the pond. To the surprise of the engineers, they found the liquid was no longer acidic, having been neutralised by alkaline calcium carbonate soil.

Mr Ward said the underground streams of water pass through a single bottleneck and to allay the fears of farmers with bores further down the water table, the company will sink a bore at that point and pump the liquid out.

Mr Ward shrugged off suggestions that the pump would not be able to cope with the flood of water coming down in the wet season and used his party trick to try to demonstrate that the liquid would be safe for drinking in any case.

He says that just to be on the safe side, paths will be cut to prevent cattle from drinking the liquid, which will then be piped back to fill the site of the open cut mine.

In a second deviation from the normal procedure for rehabilitating a uranium mine site, MKU has decided against covering the tailings pond with clay. To get sufficient clay to cover the 87 hectares of tailings and evaporation ponds, the company would either have had to strip and then revegetate a large area of land in the region, or would have had to import the clay.

MKU will save several million dollars by using waste rock from the mining operation, which it has in abundance, instead of clay. Mr Ward says that a metre of crushed rock covering the dried tailings area will cut the radiation risk to an acceptable level. The company does not believe that rain water seeping through the rock to the old pond will cause any problems.

Mr Ward said the Queensland Government had accepted MKUs submission that rehabilitation procedures cannot be uniform for all uranium mines, and that companies should be able to make the best use of the materials available at their own mine sites.

The company hopes to complete its work at the mine by the end of 1985 and hand the mining lease back to the Queensland Government. Once the lease is returned, the company will be absolved of all responsibility for the area and any monitoring of radiation in the area will be up to the Queensland Government. The company will probably be put into voluntary liquidation and its capital returned to the shareholders.

CSO: 5100/7509

JAPAN'S URANIUM NEEDS WILL GIVE AUSTRALIA HIGH PRIORITY

Melbourne THE AGE in English 15 Oct 82 p 20

[Article by Hamish McDonald]

[Text]

TOKYO, 14 October.— Japan hopes to participate in up to 10 new sources of uranium in Australia and elsewhere in the 1990s, according to a leading nuclear fuel official.

The resource director of Japan's State-owned Power Reactor and Nuclear Fuel Development Corp (Donen), Mr Koichi Hashimoto, says in a report that Donen is concentrating exploration activities in Australia, Canada and West Africa to assure future supplies.

He says Japan has secured uranium supplies until 1990 under contracts with Canada, Britain, South Africa and other countries totalling 160,000 short tons, plus an additional 35,000 tons from Australia's Ranger mine and from Niger in West Africa.

However, annual demand is projected at 12,000 tons in 1990, about 19,000 tons in 1995 and 21,000 tons in 2000. Demand will outstrip supply sometime in the early 1990s.

By 1995 Japan will need 15,000 tons a year from new sources and 20,000 tons a year by 2000, meaning that an additional 130,000 tons are needed by 2000, Mr Hashimoto says.

"Japan adopted a policy of securing some one third of uranium annually needed in the future by development imports with official - private co - operation, besides that acquired through long-term contracts, in order to secure a stable supply of uranium resources required by this nation," he says.

"In order to achieve this target a new uranium mine of 1000 tons a year scale must start producing sometime after 1990.

"By 1995, five to seven mines of the same scale and by 2000 eight to 10 mines of the scale should be developed and their uranium should satisfy demand in Japan in the form of development imports."

Mr Hashimoto says Donen's uranium discovery at Officer Basin in Western Australia had used unique methods confirming many abnormal uranium holes including a maximum assay equivalent to 1.6 per cent uranium oxide. The load is horizontal and extensive, 30 metres underground.

CSO: 5100/7509

GANDHI ANSWERS QUESTIONS ON NUCLEAR FUEL

New Delhi PATRIOT in English 22 Oct 82 p 1

[Text]

INDIA HAS BEEN UNDER TREMENDOUS INTERNATIONAL PRESSURES ON THE ISSUE OF SUPPLY OF NUCLEAR FUEL FOR THE TARAPORE POWER PLANT, PRIME MINISTER INDIRA GANDHI TOLD THE RAJYA SABHA ON THURSDAY.

The country, she said, had been able to withstand the international pressures all through, "We shall continue to do so", she declared.

Pressed for details by Mr K C Pant and other members, the Prime Minister maintained that it would not be good to discuss the subject at a stage when negotiations for the resumption of fuel supply were in progress.

India had made its position clear to the world on it. "I can assure the House that Government is well aware of the national interests", she said.

Regarding termination of the 1963 agreement with the United States on supply of nuclear fuel for Tarapur, Mrs Gandhi said the agreement was a document for a particular period and it would expire after its term was over.

Mrs Gandhi said there was no question of cancellation of the agreement.

Answering the main question, Mr C P N Singh, Minister of State for Science and Technology said that the Rajasthan Atomic Plant number (RAPP) I and II were functioning fairly satisfactorily.

After a number of supplementaries and shouting by some Opposition members, Mr Singh said the average performance of RAPP was seven per cent of its installed capacity.

The Government was looking into various problems facing the RAPP and the Parasad committee which had gone into the matter had submitted its report which was being implemented.

During the current year, unit-I of RAPP had been shutdown since 4 March, 1982 to attend to the recurrence of a leak in one of the end shields. Unit-II had been shutdown from 20 January, 1982 to June 26, 1982 to attend to capital maintenance jobs including repair of the turbine blades and replacement of the shutdown.

Unit-II was again shutdown from 4 September to 6 October, 1982 to repair leaks in another heat exchanger.

CSO: 5100/7018

GANDHI: SOVIET NUCLEAR PLANT OFFER TO BE STUDIED

Madras THE HINDU in English 14 Oct 82 p 6

[Text]

NEW DELHI, Oct. 13.

The Government has to examine the Soviet offer of a nuclear power station "in detail from various angles" before taking a final decision.

This was stated by the Prime Minister, Mrs. Gandhi, in reply to a question of Mr. Chandrajit Yadav in the Lok Sabha today. Discussions had been held with Soviet specialists in this regard, she said, adding that no such offer had been received from any other country.

Development of nuclear power was the subject of replies to several questions, dealing with the prospects for self-sufficiency, difficulties faced by various projects and the like.

"The import content of the nuclear power units currently being installed in the country has already been reduced to about 10 per cent in terms of cost. Efforts for greater indigenisation would continue," was her reply to Mr. S. A. D. Sebastian's inquiry about the steps being taken to achieve self-sufficiency.

Kalpakkam: To a question by Mr. K. T. Kosalram whether the Kalpakkam atomic plant authorities had asked for a supply of 240 tonnes of heavy water, it was stated that "the Government is taking necessary steps including augmentation of upgradation capacity to build up the inventory of heavy water required for the commissioning of the Madras atomic power project."

Mr. V. K. Pandit was told that unit-II of the Rajasthan atomic power station was shut down on Sept. 4 due to a leak in one of the heat exchangers and was resynchronised to the grid on Oct. 6. There had been no loss as the heavy water that had leaked was collected.

Mr. G. Narasimha Reddi was informed that the Soviet Union had supplied 41 tonnes heavy water in 1980 and 40 tonnes each in the subsequent two years.

The Madras power project and the Narora station, each comprising two units of 235 MWe, were behind schedule and the resultant cost escalation was Rs. 88.65 crores in the first case and Rs. 128.86 crores in the second.

CSO: 5100/7013

AEC CHAIRMAN DISCUSSES NUCLEAR ENERGY PROGRAM

Madras THE HINDU in English 23 Oct 82 p 8

[Text] VISAKHAPATNAM, Oct 22.

India had embarked on a massive nuclear energy programme to produce 10,000 MW of power by the end of this century, the chairman of the Atomic Energy Commission, Mr. H. N. Sethna, said here today, while delivering the convocation address at Andhra University. It envisaged a three-stage programme to achieve this, he said.

The first stage would be based on power production by thermal reactors using Pressurised Heavy Water Reactors (PHWRs). Natural uranium resources identified in India indicated that a natural uranium reactor programme of 5,000 to 8,000 MW could be sustained.

Substantial reserves: More recently, exploration had shown the likely existence of substantial quantities of recoverable uranium resources in new locations. Therefore, it may be possible to undertake a much larger thermal reactor programme.

According to Mr. Sethna, the total installed nuclear capacity at present was 860 MW — 420 MW from the Tarapur Atomic Power Station and 440 MW from the Rajasthan Atomic Power Station. Two other power stations were under construction. They were the 470 MW Madras Atomic Power Project at Kalpakkam which was nearing completion and the 470 MW Narora Atomic Power Station at Narora in Uttar Pradesh. He said work had also been initiated on another atomic power station of 470 MW capacity at Kakraper in Gujarat.

The second stage of the programme envisages the use of plutonium which is generated, reproduced and accumulated in the first stage, for starting fast breeder reactors wherein more plutonium from depleted uranium (of the first stage) or uranium-233 from thorium-232 is bred.

It is estimated that a 2,700 MW installed capacity of PHWRs, working at 75 per cent load factor can produce 900 kg. of plutonium every year. This will be sufficient to support a programme of one new 400 to 500 MW fast breeder reactor every alternate year.

Use of plutonium: The third stage, Mr. Sethna said, would consist essentially of the utilisation of plutonium produced in the second stage for making more fast breeder reactors. Uranium-233, produced in the second stage, was proposed to be used for constructing breeders. Additionally, advanced thermal converter reactors based on uranium-233 and thorium-23 were proposed to be constructed. More plutonium and uranium-233 could thus be produced for further recycling into fast breeders.

It was planned ultimately to achieve a self-multiplying power generation system essentially based on uranium-233 and thorium-232 thermal and fast breeder cycles.

Mr. Sethna said India's indicated and inferred reserves of uranium amounted to about 67,000 tonnes of U_3O_8. This was in addition to about 10,000 tonnes of U_3O_8 and 3.63 lakh tonnes of TH O_2 contained in monazitic sands along beaches and inland placer deposits.

"If we want to aim at a long-range nuclear power programme, our system should shift as early as possible to uranium-233 and thorium-232 base," Mr. Sethna said.

Early start: In view of the important role that fast breeders would play in meeting future requirements of energy, Mr. Sethna said India had recognised the advantage of an early start in this direction.

In order to fully develop fast breeder reactor technology, a Reaction Research Centre (RRC) had been set up at Kalpakkam with facilities for material research, radio-chemistry, radio-metallurgy and fuel reprocessing, besides a fast breeder test reactor which was in an advanced stage of construction.

Depends on first stage: The success of the fast breeder programme or, for that matter the entire nuclear energy programme, would essentially depend on the extent of success achieved in running first generation nuclear plants and extracting plutonium for use in fast breeder reactors, he said.

CSO: 5100/7019

AEC CHAIRMAN TALKS TO NEWSMEN IN RAJKOT

Madras THE HINDU in English 4 Oct 82 p 6

[Text] RAJKOT, Oct. 3--The chairman of the Atomic Energy Commission, Mr. H. H. N. Sethna, told newsmen here yesterday that Pakistan neither had the industrial infrastructure necessary for producing an atom bomb, nor had the "resources and capable brains" for the purpose. He however, said that his was a minority view.

He was referring to the view of the American defence analyst, Prof. Stephen Cohen that Pakistan might use the nuclear weapon against India in the near future.

(Prof. Cohen has said the Pakistani military establishment feels that nuclear weapons in its hands will help it some time in the future to 'grab' Kashmir in one bold, swift move. Prof. Cohen expressed this view in a paper contributed to an Asian scholars conference in the US after visiting Pakistan and having discussions with senior army officers there.)

The world was too small for a nuclear war and there was nothing like a "limited" nuclear war as feared by Prof. Cohen. Nuclear war, if at all came, would be the end of civilisation.

Giving details about Pakistan's nuclear programme, Mr. Sethna said for a nuclear warhead, Pakistan had no plutonium reactor and to produce enriched uranium-235 to weaponry standards, its resources were doubtful.

Replying to a question, he said India was behind schedule in heavy water production as "we started late on this project", but efforts were being made to cover the shortfall.

He said two nuclear reactors were almost in ready condition as "standby" to the Tarapur atomic power station which was facing fuel supply complications.

One of these reactors in Bombay was fully ready while the other one at Tarapur was progressing rapidly.

Referring to peaceful uses of nuclear research, Mr. Sethna said the country had already achieved a lot, but had a long way to go, to match the technology of advanced nations.

The only answer. A breakthrough in agriculture was the only answer to the country's problems, he said speaking on, "New horizons of science", at a function organised by the Saurashtra University Teachers' Association.

He called for strict discipline in the matter of production and uses of energy. It was essential to adopt a pattern which involved a mixture of advanced technology and one which put the manpower to maximum use.

He suggested the construction of a village road complex throughout the country and advocated the use of bullock carts for transporting agricultural produce to the nearest urban markets, against the present system of dieselised transport.

There was a tremendous scope for utilising wind energy throughout the country's coastline, he said, but regretted that very little research was being done on the subject.

About utilising solar energy, Mr. Sethna said though it was an abundant source of energy, ways were yet to be found to make it cheaper and economically viable.

CSO: 5100/7011

INDIA'S NUCLEAR PROGRAM DESCRIBED

Kuala Lumpur ASIAN DEFENCE JOURNAL in English Sep 82 pp 84-87

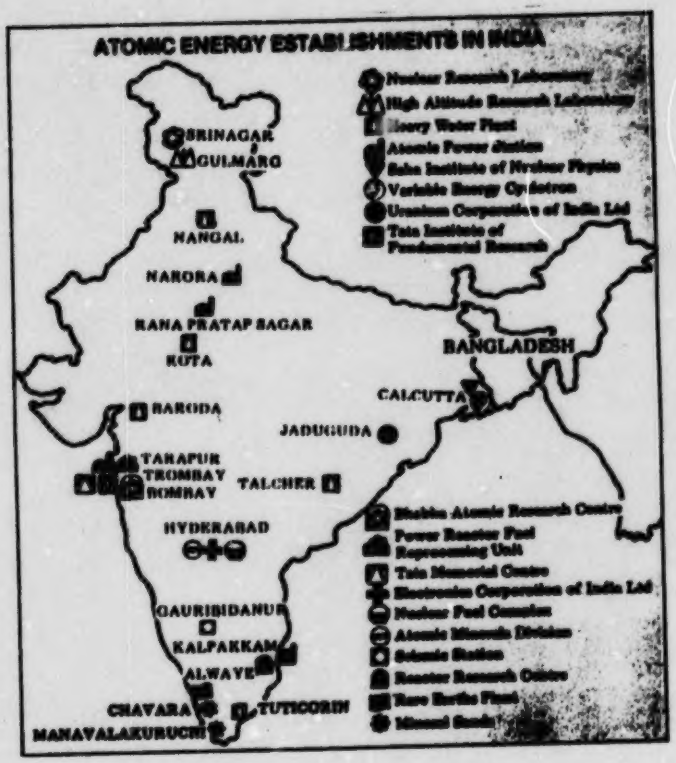
[Article by S. K. Ghosh, member, Institute for Defence Studies and Analysis, New Delhi]

[Text] India has emerged as a leader among developing countries in nuclear power generation and the peaceful utilisation of atomic energy. As a matter of fact, India is well on its way to an independent capability to design, build and operate nuclear power plants and associated industrial facilities like factories for the manufacture of reactors, nuclear fuel materials and fabricated nuclear fuel. According to a U.S. Senate Foreign Relations Committee report, released in April 1982, when its current nuclear power plants programme is implemented, India will have more (nuclear) power than Argentina, Brazil or Yugoslavia although less than South Korea, Taiwan and South Africa.

India's long-term strategy for nuclear power generation, as originally planned by Dr. Homi Bhaba, the first Chairman of the Indian Atomic Energy Commission, and seconded by Dr. Sarabhai, Dr. Bhaba's successor, consists of three stages. In the first stage to be built are the natural uranium fuelled and heavy water moderated and cooled reactors of the Canadian CANDU type — like the ones at Kota in Rajasthan, Kalpakkam in Tamil nadu and Narora in Uttar Pradesh, or like the fifth station to be constructed at Moticher (Kakrapar) in Gujarat. Natural uranium burnt in these reactors yields plutonium, which is being stockpiled for the second stage, in which plutonium (Pu-239) fuelled fast breeder reactors will be built. The core of these fast reactors will be covered by a blanket of Thorium which, under the intense radioactivity emanating from the core, will get converted into Uranium 233, another fissile material like plutonium. In the third and last stage, presumably around the turn of the century, Indian nuclear scientists and engineers hope to build commercial-scale fast breeder reactors, having U-233 as their core. This will eventually lead to a thorium uranium fuel cycle in the next century.

India's interest in the thorium fuel cycle stems from the fact that its thorium reserves are among the largest in the world - 319,000 tonnes out of the world total reserves of 1,073,000 tonnes. According to Dr. Raja Ramanna, Director-General of the Bhaba Atomic Research Centre (BARC), "while India's existing reserves of uranium could last only 20 years, there are vast deposits of thorium in the country which could be utilised as basic fuel in fast reactors producing nuclear power for the next 2,000 years".

Further, according to an assessment of the International Fuel Cycle Evaluation (INFCE), the fissile material content of cumulative spent fuel in India would be 3.45 tonnes in 1985 and 36.49 tonnes by 2,000 AD. India is, therefore, concentrating on the expansion of fuel reprocessing facilities. It has two spent fuel


ATOMIC ENERGY ESTABLISHMENTS IN INDIA
Nuclear Research Laboratory
High Altitude Research Laboratory
Heavy Water Plant
Atomic Power Station
Saha Institute of Nuclear Physics
Variable Energy Cyclotron
Uranium Corporation of India Ltd
Tata Institute of Fundamental Research
SRINAGAR
GULMARG
NANGAL
NARORA
RANA PRATAP SAGAR
KOTA
BANGLADESH
CALCUTTA
BARODA
JADUGUDA
TARAPUR
TROMBAY
BOMBAY
TALCHER
HYDERABAD
GAURIBIDANUR
KALPAKKAM
ALWAYE
CHAVARA
TUTICORIN
MANAVALAKURUCHI
Bhabha Atomic Research Centre
Power Reactor Fuel Reprocessing Unit
Tata Memorial Centre
Electronics Corporation of India Ltd
Nuclear Fuel Complex
Atomic Minerals Division
Seismic Station
Reactor Research Centre
Rare Earths Plant
Mineral Sands

reprocessing plants already working - one at BARC (Trombay) and the other at Tarapur. India also plans to build additional reprocessing plants with capacities of 100-200 tonnes a year as and when they are needed.

It will be relevant as well as interesting here to give a description of the sprawling nuclear installations in India (The accompanying map at above gives the location of each Unit). The details of the installations will reveal the wide scope and dimension of the Indian nuclear programme.

Bhaba Atomic Research Centre (BARC)

The BARC was set up as the Atomic Energy Establishment in 1957, and renamed BARC in 1967, after the name of the illustrious first Chairman of the Atomic Energy Commission, who died in an air-crash in 1966. It is the national centre for research and development work in nuclear energy and related disciplines. Its facilities include four research reactors, namely CIRUS (40 MW), APSARA (1 MW), ZERLINA (Zero energy thermal reactor)., and PURNIMA (Zero energy fast reactor); a 5.5 Mev Van de Graaff accelerator; a H-400 computer; a BEGM-6 computer; and various special laboratories. A 100-MW thermal reactor (R-5), mainly intended for research purpose, is under construction. The BARC also has a uranium metal plant and a plutonium reprocessing plant. There is also a training programme for young engineers and physicists and other scientists conducted by the BARC. Qualified engineers and scientists from this training course are employed in the various units of the Department of Atomic Energy (DAE). The training programme provides a qualified manpower base in the form of scientists, engineers and technologists.

Reactor Research Centre (RRC), Kalpakkam

Situated at the west coast of Bay of Bengal, the RRC undertakes research and development (R&D) work in all aspects of Fast Breeder Reactor Technology. The most important facility in this centre will be the 40-MW Fast Breeder Test Reactor (FBTR), which is nearing completion. According to latest reports, the FBTR will be commissioned in 1983. According to Dr. H. N. Sethna, Chairman of the Atomic Energy Commission, the major components of the FBTR are fabricated indigenously and the feasibility of 500 MW fast breeder reactors is also being examined. The FBTR, which will incorporate maximum possible parameters of a large proto-type power reactor and around which a number of other laboratories and workshop have been or are being built, will provide experience in design, construction and operation of the plutonium-fuelled, sodium-cooled fast reactor. Other facilities completed or are being built in the sprawling RCC complex comprise:

1) Materials Science Laboratpry;

2) Radio-Chemistry Laboratory;

3) Radio-Metallurgy Laboratory;

4) Safety Research Laboratory;

5) Fuel Reprocessing Development Laboratory

Apart from rendering help in construction and operation of FBTR, the objectives of these laboratories are the development of an efficient fuel cycle, sodium technology, development of materials and other research and detailed studies in connection with fast reactor technology. In building the RRC, particularly the FBTR, India has secured the assistance and technical collaboration of France, one of the pioneer nations which has developed the fast breeder reactor technology to an advanced and operational stage. Engineers and physicists from the RRC have got first hand training in developmental as well as operational aspects at the French fast neutron research reactors like the Rapsodie, Harmonie and the Masurca. (Indian engineers and scientists were trained particularly on Rapsodie).

Power Projects Engineering Division (Bombay)

This division undertakes the design, construction, commissioning and operation of nuclear plants throughout India. It is presently running the Tarapur and Rajasthan Atomic Power Stations and constructing the Madras Atomic Power (MAPP) and the Narora Atomic Power Projects. The Moticher (Kakrapar) power plant in Gujarat will also come under its jurisdiction. This plant will have two natural uranium-fuelled and heavy water moderated reactors incorporating the standardised basic design features of the Narora reactors, suitably adapted to local conditions.

The Tarapur plant with two boiling water-type reactors (total output 420 MW), fuelled with 3 percent enriched uranium supplies electricity to part of Maharashtra and Gujarat. The Rajasthan Atomic Power Project (RAPP) at Rana Pratap Sagar of Rajasthan has two natural uranium-fuelled and heavy water moderated and cooled pressurised reactors with a total output of 440 MW. It supplies electricity to part of Rajasthan. The Madras Atomic Power Project (MAPP) at Kalpakkam has two pressurised heavy-water type 230-MW reactors, similar to the ones at RAPP. However, unlike Tarapur and RAPP, where foreign collaboration exists (for Tarapur the USA and for RAPP, Canada), there is no foreign collaboration or assistance in MAPP's construction and hence, it is free of international safeguards. The Narora Atomic Power Station, under construction in Uttar Pradesh, also consists of two reactors of 235 MW each. Two more units of 235 MW each will be eventually added to the Narora Atomic Power complex. There is also no foreign collaboration in the Narora station's construction, and hence it is also free of safeguards.

These apart, the Department of Atomic Energy (DAE) has sanctioned six more units during the Sixth Five-Year Plant (1980-85). Of the six units sanctioned sites for two reactors has already been selected at Moticher (Kakrapar) in Gujarat.

Nuclear Fuel Complex (Hyderabad)

The Nuclear Fuel Complex is designed to meet the fuel requirements of the nuclear power reactors. One of its major jobs is to make fuel bundles out of enriched uranium supplied by the USA for the Tarapur Plant. Its working has since been adversely affected on account of the late or non-arrival of enriched uranium from the U.S.A.

However, the complex is currently in the process of expansion at an estimated cost of Rs. 13.06 crores "from its present capacity to manufacture 100 tonnes of finished fuel per year to 210 tonnes of finished fuel per year to meet the requirements of the heavy water reactor programme", according to a statement by Prime Minister Mr. Indira Gandhi in the Parliament (Rajya Sabha).

The Heavy Water plants at Baroda (annual production capacity 67 tonnes) and Tuticorin (Tamilnadu) (67 tonnes) are currently in operation, while a substantial part of the plant at Kota (100 tonnes) has been commissioned - the plant was expected to be fully operational by early 1982. At Talcher (Orissa) testing of the heavy water plant is practically over and subject to availability of synthesis gas; the plant was to be in operation by early 1982. There is also a small plant (14 tonnes) at Nangal, which is operational.

The Minister of State for Defence, Mr. Shivraj Patil, told the Parliament (Lok Sabha) on 9th September 1981 that India would reach self-sufficiency with respect to heavy water in March, 82 with heavy water plants at Kota and Talcher (Orissa) coming into operation. The total annual production of heavy water then would be 300 tonnes. The Government also plans to set up heavy water plants in the next phase at Thal-Vaishet in Maharashtra and another at Manuguru in Andhra Pradesh.

The Atomic Minerals Division (headquarters at Hyderabad), with five regional headquarters in other parts of the country, is responsible for research and development activities pertaining to radiometric and geological surveys, exploration, prospecting and development of uranium, thorium and other atomic mineral resources needed for nuclear power programme.

Nuclear Research Laboratory (Srinagar) is devoted to applied research in nuclear and radiation physics.

The High Altitude Research Laboratory at Gulmarg, set up in 1963, provides facilities for high altitude research to all scientific institutions and universities in the country.

The Variable Energy Cyclotron, set up at Bidhannagar, Calcutta, by the BARC, is now operating on a limited basis. It is a national facility for advanced work in nuclear physics, nuclear chemistry, isotope production and radiation damage studies for reactor materials.

Gauribidanur Seismic Station

Located 80 Km. north of Bangalore, this station was set up towards the end of 1965 in collaboration with the U.K. Atomic Energy Authority. It helps in detection and identification of underground nuclear explosions besides facilitating seismic research.

Industrial Units (connected with D.A.E.):

The following industrial units are intimately connected with the Department of Atomic Energy:-

- The Indian Rare Earth Corporation Ltd.
- The Electronics Corporation of India - it was established as a spin-off of the BARC.
- The Uranium Corporation of India Ltd. (Jadugoda), Bihar : Founded in October, 1967, the corporation is responsible for mining and processing of uranium ore. At present, it is producing uranium concentrate from the ore mined at Jadugoda.

Allied Institutions:

There are some allied institutions which cooperate with the Department of Atomic Energy. These are:

- Tata Institute of Fundamental Research (Bombay);
- Tata Memorial Centre (Bombay); and
- The Saha Institute of Nuclear Physics (Calcutta).

However, India's atomic power programme has, of late, received setbacks from two quarters. First, consequent on the peaceful nuclear explosion of May 1974, Canada unilaterally abrogated its nuclear cooperation agreement with India in May 1976. This has ended over two decades of Indo-Canadian Collaboration in peaceful utilisation of nuclear energy and hampered the growth of Indian nuclear technology. As a result of this abrogation the two nuclear power projects in Rajasthan (RAPP-I and RAPP-II) suffered a lot on account of Canadian ban on nuclear material exports. However, the Canadian abrogation of nuclear cooperation treaty ultimately turned out to be a boon in disguise - it gave impetus to self-reliance, and many vital parts, which were previously imported from abroad, are now being manufactured indigenously. Nevertheless, the commissioning of the two RAPP power stations was considerably delayed.

Secondly, the American reluctance and abnormal delay in supplying the stipulated enriched uranium-(according to the 1963 Indo-US agreement on Tarapur the USA is to supply the required enriched uranium for the Tarapur Plant till the expiry of the pact in 1993, and India is barred from going to any other sources for the fuel) - has caused enormous difficulty in the operation of the Tarapur Plant and kept idle for a considerable period of time the Hyderabad Nuclear Fuel Complex. With the coming in of the Reagan Administration, the supply position of nuclear fuel for Tarapur has become even more difficult. The Reagan Administration insists on full-scope safeguards, that is, safeguards for all nuclear installations in India irrespective of American collaboration or not. This position is not acceptable to India, hence the delay in the supply of enriched uranium (3 per cent enriched). Not only that, the USA is reported to have delayed the supply of some vital spare parts, without whose replacement the Tarapur plant may become accident-prone.

There are two possible ways to get rid of the difficulty concerning the Tarapur plant - either to abrogate the 1963 pact with the USA and look for other foreign sources of supply of nuclear fuel, or to work for indigenous sources of alternate fuel. The Indian Government appears to have taken the second alternative. Prime Minister Mrs. Indira Gandhi said in the Indian Parliament (Rajya Sabha) on 3rd September, '81, the Tarapur plant would be kept working with alternative means "irrespective of further fuel supplies from the United States". Mrs. Gandhi pointed out that the manufacture of alternative fuel for Tarapur would not need redesigning the Hyderabad plant.

The alternative fuel would consist of a mixture of plutonium and uranium oxide. Plutonium, being a fissile element, would provide neutrons for splitting the uranium atoms. The plutonium would most probably come from the reprocessing of spent fuel for which two facilities are already operational - one at Trombay and the other at Tarapur.

On account of these difficulties, the present nuclear power generation capacity has remained at a meagre total of 800-900 megawatts (MW) instead of the expected total of 1,800 MW (the Sarabhai profile of the late-sixties set the target of eighties at 2,700 MW).

However, a sum of rupees 1051.04 crore has been set apart for nuclear programme during the Sixth Five Year Plan period (1980-85). This would provide additional nuclear power capacity of 690 MW, besides, as pointed out earlier, work on six more reactors, each with 235 MW capacity, will start. When these reactors are completed, the nuclear power generation capacity is expected to rise to 3,210 MW. The DAE hopes to generate by the turn of the century 10,000 MW of nuclear power. It is no doubt a very tall order, considering the lack of fuel (enriched uranium) and of heavy water.

India's international relations in the atomic field is also wider. For the 24th year in succession since the inception of the International Atomic Energy Agency (IAEA), India was nominated in 1980 a member of the Agency's Board of Governors. Agreements of collaboration between India and various foreign countries on the peaceful uses of atomic energy were signed from time to time. Agreements signed with various countries which became effective during 1980-81 include Syria, Yugoslavia and

Indonesia. Earlier similar agreements were signed, with, among other countries, Egypt and Bangladesh. France's collaboration in the FBTR has already been mentioned. The Soviet Union also came to India's help in supplying heavy water for the Rajasthan Atomic Power Project, of course under the usual IAEA safeguards. With the other Super Power-the USA- a tussle has been going on over the supply of fuel for the Tarapur Plant, details of which have been given earlier.

Military Implications of the Programme

The U.S. Senate Foreign Relations Committee, in a report released in April 1982 (mentioned earlier), visualises that India will enter the 1990s with a capacity to produce an arsenal of nuclear weapons. It notes that India has already demonstrated its capability to design and make a nuclear explosive compact enough to fit into a drill hole for an underground test as early as in May 1974. The design of the nuclear explosive suggests a compactness and configuration close to that of a usable nuclear weapon.

The Senate Committee report is highly speculative and merely of academic interest, since the Indian Government has more than once declared its intention not to manufacture nuclear weapons. Way back in May 1974, when India carried out its first, and so far the only, underground nuclear explosion, India was listed by Western observers among the few countries immediately to join the nuclear weapons club. Since then over eight years have passed, but nothing has happened so far.

As a matter of fact, India has the unique distinction of being the only country in the world, which, despite its expertise in nuclear weapons technology and ability to produce the weapons, has abstained from doing so and has repeatedly declared its intention not to produce them. As late as September 1981, Prime Minister Mrs. Indira Gandhi reiterated that atomic energy in India was being used "only for peaceful purposes". In an interview with Japanese daily, *Ashahi Simbun's* chief of correspondent of Asia general bureau, in the same month (September, 1981), the Indian Prime Minister said if there was another war with Pakistan it was more likely to be fought with conventional weapons. Asked whether India would develop nuclear weapons in case Pakistan acquired them, Mrs. Gandhi said: "We are not dependent on what Pakistan does. We have to make our policy independently".

Asked whether there was some possibility of India conducting another peaceful nuclear explosion (PNE), the Prime Minister replied, "No, we don't know. If we feel it is necessary, and our scientists want this, then we will think about it".

However, India has not surrendered its nuclear option, which means a future Indian Government, in any contingency, may take the decision to produce nuclear weapons.

As pointed out in the US Senate Foreign Relations Committee report, India's capability to produce compact and usable nuclear weapons has been demonstrated in the underground nuclear explosion conducted in May 1974. As for fissile material, it will have sufficient quantity in a few years' time from the unsafeguarded nuclear reactors of the MAPP and Narora. As for a workable delivery system, "the research involved in the development of (the four-stage solid-fuelled) SLV-3 closely parallels that of an ICBM". Indeed, the space booster technology involved in the lifting of heavy satellites and putting them in earth's orbit is essentially the same as that necessary for the development of long-range strategic ballistic missiles. But an effective delivery system also needs a very sophisticated guidance system for target accuracy as well as the development of re-entry heat shields (re-entry heat-shields are needed to prevent re-entry vehicles burning up due to friction in the atmosphere), which are not essential for merely lifting and putting a satellite in earth's orbit. Reports suggest that Indian space scientists have already taken up research and development work on these two counts, since sophisticated guidance systems and reentry technology are also necessary for peaceful purposes-for bringing down satellite payloads to a pre-determined spot on earth for examination of data collected by the satellite.

As pointed out earlier, India has a growing technical manpower base in the form of scientists, engineers and technologists as well as a sound industrial base. In short, as pointed by a nuclear physicist of the Indian Institute for Defence Studies and Analysis (IDSA), New Delhi, "India has the infrastructure for projecting a 'medium nuclear power' profile".

To conclude, since India has not surrendered its nuclear option, the sooner a beginning is made to utilise the spin-off benefits of nuclear and space technologies for purposes of defence the better. In any case, a greater coordination among the Department of Atomic Energy, the Indian Space Research Organisation (ISRO), the Electronics Commission and the Defence Research and Development Organisation is essential. At present, according to the IDSA nuclear physicist, this coordination has been "minimal". But the coordination should be maximum, since it will keep the nation ready and vigilant and will not put the country in a tight corner as and when the necessity for revising the nuclear option arises.

CSO: 5100/4306

INDIA REPORTEDLY SELF-RELIANT IN NUCLEAR FUEL

Bombay THE TIMES OF INDIA in English 21 Oct 82 p 1

[Text] New Delhi, October 20 (PTI).

India has achieved self-reliance in nuclear fuel for its power programme, the minister of state for science and technology, Mr. C. P. N. Singh, told Mr. M. Ramgopal Reddy in a written reply in the Lok Sabha today.

The Prime Minister, Mrs. Indira Gandhi, said that discussions were continuing with France for fuel supplies for Tarapur under the framework of the 1963 co-operation agreement and the safeguards agreement of 1971 which flows therefrom.

"Should India and France reach a mutually acceptable solution, India will continue to get necessary fuel supplies for the Tarapur atomic power station without any more obligations than those assumed under these agreements," the Prime Minister told Mr. Vijay Kumar Yadav in a written reply in the house.

Mrs. Gandhi said the development of MOX fuel for nuclear reactors was part of the country's overall research and development efforts.

She said it was not possible to segregate the expenditure incurred on it. The feasibility of using MOX fuel in light water reactors had been established, she said.

/Mr. C. P. N. Singh said that the existing proven resources of uranium in the country were considered adequate to meet the target of increasing the nuclear power capacity from the present 860 MW to 10,000 MW by the end of the century./ [in boldface]

The minister told Mr. Harinath Misra that provision had been made in the sixth plan and adequate provision would be made in future five-year plans as well for the construction initially of 235 MW reactor units of the Narora type to be scaled up later to 500 MW unit size.

Mr. Singh said that in addition to the 860 MW installed capacity of the operating nuclear power station, the installed capacity of the power projects under construction would be 1410 MW.

The facilities to manufacture fuel and heavy water were being augmented as required. To enable indigenous industry to gear itself to the production of the various components required for this programme, a dialogue with the representatives of industry had also been initiated, he said.

Mr. Singh said the optimum production of heavy water at Kota and Talcher plants might be achieved within three years, if they start functioning as expected by the end of the current financial year.

CSO: 5100/7016

NUCLEAR WASTE PLANT TO BE COMMISSIONED SOON

New Delhi PATRIOT in English 19 Oct 82 p 8

[Text]

BOMBAY, Oct. 18 (UNI).

THE radioactive waste immobilisation plant at Tarapur, now undergoing trials, is expected to be commissioned by this year-end, reports UNI.

According to an article in a special issue of 'Nuclear India' — the official organ of the Atomic Energy Department — the plant will use a semi-continuous pot process, involving calcinations, followed by melting in the processing vessel and subsequent casting of the glass in a storage container.

The objective is to safely isolate the high-level radioactive wastes generated in the nuclear fuel cycle from man's environment. The general practice in all countries is to store these wastes, in a liquid form in high-integrity stainless steel tanks in underground concrete vaults.

With the available technology, the article says, there are a number of designs available for such special storage tanks, fitted with cooling facilities and required instrumentation. Additional safety features with sufficient redundancy and facilities for transfer of wastes are also provided.

Instances of leakage have occurred — some minor and some major — but the system has proved to be basically safe and satisfactory provided strict quality control is maintained followed by surveillance.

Stressing the need to keep spare tanks in case of accident or unexpected tank failures, the article highlights the necessity to go on building adequate storage tanks as the volume of wastes increases. But this involves a large capital outlay as the cost of storage tanks with high standards of fabrication and safety measures is high.

Pointing out that liquid storage can at best be only a temporary measure, the article says its conversion into a suitable solid form as soon as practicable offers a distinct advantage in handling, transport, storage and ultimate disposal, and minimises the degree of surveillance and monitoring requirements.

The currently accepted management concept involves solidification of the wastes, their containerisation, dissipation of a significant fraction of decay heat in a controlled manner in an engineered containment and, finally, disposal in a repository located in deep geological media.

A consensus is developing that the entire waste isolation scheme should be viewed as a system with a number of barriers built in to prevent movement of radio nuclides from the repository to the human environment. The system components constituting the barriers would include the solid waste form, the package, the backfill and the host rock.

Each of these barriers is important in itself and efforts to maximise their effectiveness will always be a continuing activity, but the natural geological barrier is perhaps the most important component in isolation of radioactivity and should be able to prevent any accidental release due to unforeseen failures of other barriers the article says.

While sufficient expertise exists in the nuclear industry to handle radioactivity, high-temperature processing of highly radioactive streams impose severe demands on plant designs, it says.

Effort to develop an engineering process for solidification of the high-level wastes have so far been mostly restricted to obtain glass or ceramic products. A number of processes, developed in different countries, vary in several details but they essentially involve a process of evaporation and calcination of the waste with the glass flux additives added either before or after the calcination, followed by melting.

The cost of managing the wastes generated from reprocessing spent fuels would depend on many factors, the article points out. In India it would work out to about Rs 720 per kg of heavy metal reprocessed.

CSO: 5100/7015

FRENCH INITIATIVE AWAITED IN NUCLEAR IMPASSE

Talks with Guttman

Madras THE HINDU in English 15 Oct 82 p 9

[Article by G. K. Reddy]

[Text] NEW DELHI, Oct. 14.

The Secretary-General of the French Foreign Ministry, Mr. Francis Guttman, had a preliminary round of talks today with the Foreign Secretary, Mr. M. K. Rasgotra, on Indo-French relations.

The two reviewed the progress of the implementation of the decisions taken during the Prime Minister's visit to Paris in November last and also the preparations under way for the French President, Mr. Mitterrand's visit to India next months.

The talks will be concluded tomorrow when Mr. Guttman might raise the nuclear issue if he has come with some new ideas on the subject. The Indian view is that the ball is now in the French court and it is for the French Government to find a way out of the impasse created by its second thoughts on the safeguards question.

Meanwhile, the Government of India continues to strike an optimistic note that the controversy would be settled amicably well before Mr. Mitterrand's visit. But as yet there is no indication of any new formulation emerging from the French side that can fully comply with the Indian contention that all safeguards on Tarapur must end automatically in 1993 with the expiry of the 1963 agreement.

Differences narrowed: The talks that the Chairman of the Atomic Energy Commission, Mr. H. N. Sethna, had in Vienna last month with his French counterpart, Mr. Michel Pecqueur, narrowed down the differences, but did not establish any mutually acceptable common position on the issue of additional safeguards, especially the perpetuity clause.

The French Secretary-General was due to arrive in Delhi on October 7 for these talks, but the visit was postponed by a week to suit his convenience. The postponement led to speculation that he was taking more time to finalise a new formula on the fuel supply arrangement.

But it became known later that Mr. Guttman sought the postponement since the French Foreign Minister, Mr. Claude Cheysson, had gone with President Mitterrand, on his African visit. It is not customary in the French Foreign Ministry for both the Minister and the Secretary-General to be away from the country at the same time, since at least one of them is required to be present in Paris to deal with any urgent issue that might arise.

The French Defence Minister, Mr. Charles Hernu, who left yesterday after concluding his visit, had wide-ranging talks on the prospects for increased defence cooperation between India and France. But he came forward with no new proposals for selling any extra equipment other than what was already under consideration.

He did not also make any special suggestions for closer collaboration on a long-term basis in designing and developing new weapon systems as the British Defence Minister, Mr. John Nott, did during his recent visit to Delhi.

The French Government will probably come forward with new proposals for increased cooperation in the defence and economic spheres during Mr. Mitterrand's visit. But unless the nuclear hurdles are removed in time, the Mitterrand visit could run into rough weather since India feels very strongly about the French attempts to impose stiffer safeguards contrary to the earlier understanding that the fuel will be supplied within the framework of the 1963 Indo-U.S. agreement.

Little Progress Reported

Madras THE HINDU in English 16 Oct 82 p 9

[Article by G. K. Reddy]

[Text] New Delhi, Oct. 15.

The Indo-French talks ended today without much progress on the nuclear issue other than providing a further opportunity to air their views on the persisting differences.

The fact that the Chairman of the Atomic Energy Commission, Mr. H. N. Sethna, who was in Delhi to be available for consultations, did not participate in these talks indicated that nothing new had emerged from the two-day discussions.

The talks concluded today in the sense that the Secretary-General of the French Foreign Ministry, Mr. Francis Guttman, was leaving for Srinagar tomorrow morning on a day's trip to Kashmir before returning to France. The Foreign Secretary, Mr. M. K. Rasgotra, was also due to go tomorrow to Wellington in the Nilgiris to address the Defence Services Staff College.

It was, therefore, decided that the two sides would continue the nuclear negotiations through diplomatic channels on the basis of the new approaches reportedly spelt out today by Mr. Guttman, while restating the French position on the safeguards question. The Government of India wants to get this issue out of the way as early as possible, within the next three or four weeks, before the President, Mr. Mitterrand's visit.

The Indian and French officials were maintaining strict silence on what exactly transpired at today's discussions, to avoid adverse publicity to the continued absence of an accord on the safeguards issue. The spokesman of the External Affairs Ministry declined even to confirm or deny whether the subject had figured at today's discussions.

CSO: 5100/7014

FAST BREEDER REACTOR TO BE PLACED IN SERVICE

Kuala Lumpur BUSINESS TIMES in English 21 Sep 82 p 17

[Article by Dilip Ganguly in New Delhi]

[Text] INDIA'S first plutonium-based fast breeder reactor will go on stream soon heralding the second phase of the nation's quest for nuclear power.

Atomic energy officials said the 15 megawatt (MW) fast breeder reactor (FBR) at Kalpakkam, near Madras in south India, was almost ready and its success will enable the scientists to chalk out a definite plan for the second phase.

If everything goes well, India will set up everal small FBRs with giant 500 MW plant by he turn of the century.

In the first phase of ndia's nuclear energy rogramme that began in 1955 with the decision to set up the Tarapur plant near the west coast city of Bombay, the emphasis was on heavy water reactors. Tarapur was fuelled by enriched and natural uranium obtained from the United States and indigenous sources supplied by other plants.

The natural uranium obtained from Jadugoda mines of the Uranium Corporation of India in the eastern Bihar state and converted into fuel elements at the nuclear fuel complex at Hyderabad in the southern Andhra Pradesh state produced electricity and the plutonium as a by-product.

The fast breeder reactor will also produce more plutonium as uranium 233 from thorium placed in the blanket, the scientists said.

India has one of the largest thorium reserves in the world on a par with the United States at about 320,000 tonnes each.

Brazil and Canada come second with 160,000 tonnes each.

This puts India in a tremendous advantage in going ahead with the FBRs, the scientists said.

The breeder reactor will not only power the plant but also create more fuel to recharge itself and for a start-up charge for similar reactors.

It will provide much cheaper power than the present nuclear energy plants or those run on fossile fuels such as coal, oil or natural gas which are in short supply or being fast depleted.

The scientists said they will also be inherently safer than that the existing nuclear power plants and kinder to the environment.

While the United States, Britain and France have been concentrating upon the use of uranium 238 as breeder material because of the plentiful supply of uranium available to those countries, Indian scientists have conbentrated on the production of uranium 233 as fissible material from thorium because of India's abundant reserves of that mineral, the scientists said.

The breeder reactors can also convert thorium to uranium 233 which is as good as uranium 235 as a fissile material and can be used in nuclear power plants, they added.

As part of its second phase nuclear programme, Dr H.N. Sethna, chairman of the Atomic Energy Commission, laid the foundation stone for a new thorium-processing plant at Thrombay, a suburb of Bombay, last March. The plant will produce 300 tonnes of thorium compounds annually when it starts operation in 1984.

At present only three per cent of the electricity produced in the country is from nuclear power, and the planners' original target of 8,000 MW of power by the beginning of the 1980s has not been achieved.

The actual figure is a mere 400 MW, much of it from Tarapur and the rest from the Canadian-built natural uranium-fuelled heavy water-moderated reactor at Rana Pratap Sagar in the state of Rajasthan. — AFP

CSO: 5100/8101

BRIEFS

KOTA NUCLEAR PLANT--KOTA, September 30 (PTI)--A COOLANT channel of the first unit of the Rajasthan atomic power plant has been removed following the detection of a pinhole leak. The power plant has been shut down for over a year. A spokesman of RAPP said that preliminary inspection of the main defect has been completed and the unit will begin operation in a "couple of months." The second unit which was closed down on September 4 and was expected to be started today will now start functioning from October 4, the spokesman said. [Bombay THE TIMES OF INDIA in English 1 Oct 82 p 5]

GANDHI ON TARAPUR--Prime Minister Indira Gandhi said on Wednesday that stocks of nuclear fuel at Tarapur atomic power plant was fast running out and no further consignment was expected from the United States, reports PTI. However, the Government would ensure continued operation of the plant, she said in the Lok Sabha in a written reply to Mohd Asrar Ahmed. She declined to spell out the details of future plans for running the plant saying it would be premature to do so. Operations in the enriched uranium sections of the nuclear fuel complex of the Department of Atomic Energy in Hyderabad have been suspended from the second week of September due to the non-receipt of supplies of enriched uranium, Mrs Gandhi said in a written reply to Mr Dava Ram Shakya. There would be no alternative but to close down the enriched uranium sections of the complex in the event of non-receipt of further supplies, she said. [New Delhi PATRIOT in English 7 Oct 82 p 5]

MIXED OXIDE FUEL--Bombay, 30 Oct--Dr. Raja Ramanna, Director, Bhabha Atomic Research Centre (BARC), said here today that the centre had developed mixed oxide fuel (MOX) and this was at the disposal of the Government. He was speaking at the Founder's Day function on the occasion of the silver jubilee of BARC. A centre to work on new types of accelerators and fusion was proposed. The reprocessing plant at Trombay would also go into production early next year. It was indeed remarkable that over the last 25 years, BARC had maintained the reputation of being one of the finest laboratories in the country, if not in the world, he said. Tributes were paid to the late Homi Bhabha by Dr. A. R. Gopala Iyengar, Mr. J. J. Bhabha (brother of Homi Bhabha), Mr. N. K. Prasad, Mr. B. V. Srikantan and Mr. J. Shankar. Medallions were presented to the speakers at the function. [Text] [Madras THE HINDU in English 31 Oct 82 p 1]

THAL-VAISHET HEAVY WATER UNIT--New Delhi, October 20 (PTI): Two new heavy water plants are being set up at Thal-Vaishet, Maharashtra, and Manuguru, Andhra Pradesh, the Lok Sabha was informed today. The installed capacity of the Rs. 187.65-crores Thal-Vaishet plant would be 140 tonnes and that of the Rs. 421.60-corres Manuguru plant would be 200 tonnes. The Thal-Vaishet plant was expected to be completed in 1987 and that of Manuguru in 1988. The minister of state for science and technology, Mr. C. P. N. Singh, told Mr. G. Narsimha Reddy in a written reply that the financial sanction for the projects had been issued and consultants appointed. [Text] [Bombay THE TIMES OF INDIA in English 21 Oct 82 p 9]

CSO: 5100/7017

CONSTRUCTION OF ATR PROVEN REACTOR TO BE UNDERTAKEN

Tokyo TOKI NO KEIZAI in Japanese 1 Sep 82 pp 30-35

[Article: "The Future of the Electric Power Development Co Ltd Which Became the Core for the ATR Construction"]

[Text] Although it has been decided that the EPDC (Electric Power Development Co) is to undertake the construction of the ATR (advanced thermal converter reactor) proven reactor, there are a mountain of problems related to this construction project that need to be solved. Therefore, the EPDC is not honestly happy about it.

As Different Pigeon From Pheasant

When it was decided that the construction of the ATR proven reactor would be undertaken by the EPDC, President Yoshihiro Ryokaku said: "We thought we were shooting for a pheasant, but a pigeon came down."

The EPDC dreamed for many years of advancing into nuclear power generation. It was aiming at introducing Canada's heavy water reactor (CANDU). Its dream of many years is to be realized in the ATR (a pigeon) for the present, and not in the CANDU (a pheasant).

The company is not happy even though its dream of many years can now be realized, because there is so much difference between a "pigeon" and a "pheasant" from the viewpoint of game. How is this pigeon to be cooked, or in the first place will the pigeon be cooked at all? The EPDC's outlook is full of difficulties.

There are a number of specific problems: 1) Who is going to pay the construction cost of the ATR proven reactor (approximately 120 billion yen) which is much higher than that of a light water reactor? 2) Who is going to buy the more expensive electricity once the ATR proven reactor (600,000 kW) is built? 3) A large sum of money will be needed to establish a nuclear fuel cycle for the ATR proven reactor consisting of a nuclear fuel reprocessing plant, a uranium enrishment plant, and a waste material treatment plant. 4) As to the construction site for the ATR proven reactor, the most likely place for the moment remains a site at Omacho, Shinokita-gun, Aomori Prefecture, which attracted the EPDC's nuclear energy construction project. However, the attraction was originally based on the premise of constructing a CANDU reactor, so it is uncertain whether the attraction still exists for the construction of an ATR proven reactor. 5) Assuming that an ATR proven reactor is to be constructed at Omacho, then what happens to the CANDU reactor which the EPDC had sought so tenaciously? These problems concerning the construction of the ATR proven reactor come to mind upon a brief reflection of the matter. Moreover, every one of these problems is an urgent problem.

Now then, why is the EPDC going to construct an ATR proven reactor which is laden with so many problems in spite of the danger that it may never be realized? To understand this, we must review the history of the EPDC, which has just celebrated its 30th anniversary, with its many turns and twists. In a few words, the "fate" imposed on it to play a complementary role to the nine electric power companies has followed it even when it is making an advance into the nuclear power era.

The EPDC was established in September 1952 in accordance with electric power development policy. Since then, the EPDC has ambitiously undertaken the development of large scale domestic hydroelectric power and construction work at almost all advantageous development sites. It has also undertaken the construction of a mine-site coal-firing thermoelectric power plant in line with domestic coal policy.

In 1960, the electric power development promotion law was revised and nuclear power was incorporated into the articles of the EPDC's business objectives. Nuclear power development was tackled in earnest only after 1968, when the nuclear power office was established within the EPDC. This nuclear power office carried out studies of the CANDU reactor and an advanced gas-cooled reactor (AGR) of Great Britain. The CANDU reactor was studied with the premise of introducing it to Japan. The EPDC was first among Japan's electric power circles to undertake research into nuclear power generation around 1954, soon after it was established.

The EPDC has thus aggressively engaged in the development of electric power by taking the lead in the Japanese electric power situation. However, the relationship between the EPDC and the nine electric power companies has not necessarily been congenial. The nine electric power companies were afraid of administrative intervention by MITI through the EPDC, because it, after all, was a company born of a national policy. The nine electric companies took an attitude of "rejection" toward the EPDC from the time of its inception. This rejection was expressed frankly when the nine electric power companies competed with the EPDC on matters concerning the introduction of the CANDU reactor.

It Used To Be Pioneer of Nuclear Power Generation

To the EPDC, which is the pioneer of nuclear power generation in Japan to enter into the nuclear power era is to attain its earnest wish. However, the nine electric power companies have felt uneasy about the EPDC's advance into nuclear power which is expected to become the mainstream of the future electric power, so they have maintained vigilance againt the EPDC throughout. However, in 1969 the nine electric power companies consented to the cooperation of the EPDC in constructing the ATR prototype "Fugen" which was undertaken by the Power Reactor and Nuclear Fuel Development Corporation (PRNF). The nine electric power companies were aware that they could not prevent the EPDC from entering the nuclear power field forever, but they did not want to compete with it in the field of nuclear power generation. In these circumstances, consenting to the EPDC's cooperation in the construction of the ATR "Fugen" was the most suitable thing to do as far as the nine electric power companies were concerned. By forcing the ATR upon the EPDC, the EPDC would be practically shut out of the light water reactor which is Japan's mainstream nuclear reactor.

In spite of the fact that the scheme of the nine electric power companies was so obvious, these nine were able to achieve their goal because it was the "fate" of the EPDC to play a complementary role to the nine companies.

However, there is no doubt that the EPDC has gained considerably from participating in the construction and operation of the "Fugen". Its technical know how concerning nuclear power generation must have been improved through this experience. Then the EPDC undertook on its own initiative the investigation and inspection of AGR and CANDU reactors, and announced in 1976 that it would introduce the CANDU reactor.

"In order to free Japan from its dependence on the United States on energy matters and to disperse the danger, it is necessary to introduce a 'natural uranium-heavy water reactor' as a strategic reactor type which is complementary to the 'enriched uranium-light water reactor'" was the reason given by the EPDC. This plan received the overall support of MITI.

On the other hand, the nine electric power companies objected at first to the EPDC's move arguing that "Japan's nuclear energy policy is to advance from the light water reactor to the fast breeder reactor (FBR), and the introduction of the CANDU will destroy this nuclear power policy." However, in 1978, they consented to the introduction of the CANDU reactor by the EPDC as a "proving reactor." The concept of a "proving reactor" is to persistently segregate the CANDU reactor from the electric power generating system by allowing the construction of a single unit for the purpose of ascertaining its economic feasibility and safety. An attempt to treat the EPDC's advance into the nuclear power field as an "exception" can be seen in this instance also.

For a while, it appeared as though the EPDC's deep attachment to the CANDU reactor might be realized. But the EPDC's dream of entering the nuclear power field through the CANDU reactor was crushed by a flat rejection in August 1979 by the atomic power commission: "There is not sufficient reason for introducing the CANDU reactor."

The atomic power commission's decision was no doubt strongly affected by the accident that occurred in March of the same year at the Three Mile Island nuclear power plant in the United States. Nevertheless, such a disappointing ending was very unsettling for the EPDC. Although the atomic power commission made its conclusion known, the plan to introduce the CANDU reactor did not basically change. The EPDC continued to carry out safety proving experiments and general technical investigation in preparation for the introduction of the CANDU reactor. Then came the decision to construct an ATR proven reactor.

Electric Power Companies Gain Confidence Through High Operating Rate

If we review briefly Japan's nuclear power generating system we will be able to understand the significance of the CANDU reactor and the ATR as well as the dilemma of the EPDC and the nine electric power companies.

The light water reactor is the mainstream of Japan's nuclear power and light water reactor nuclear power generation consists of a boiling water reactor (BWR) and a pressurized water reactor (PWR).

Originally, the light water reactor technology was imported from the United States, but numerous improvements in the light water reactor have been made by Japanese technology. As a result, the operating rate of Japan's nuclear power generators was better than 60 percent for 2 years in a row, in 1980 and 1981. An operating rate of 70 percent is considered the limit for the nuclear power generator, and an operating rate of 60 percent is considered to be almost full operation. Incidentally, the operating rates in foreign countries, except for an outstanding 68.1 percent for West Germany, are all under 60 percent; namely, 55.8 percent for the United States, 44.3 percent for Great Britain, and 58.1 percent for France, which is said to be most aggressive in developing nuclear power generation (these figures are for the 1981 calendar year).

This operating rate has extremely great significance economically, so much so that it may be directly connected to the argument concerning whether a nuclear power plant is needed. In this sense, each electric power company gained confidence through achieving the high operating rate. To Tokyo Electric Power, in particular, which owns one-third of Japan's total nuclear power generating capacity, it was a great confidence booster, because all its nucelar power reactors are of the BWR type, which is in the minority among the world's nuclear power reactor population, and it felt insecure. Now, the company is quite confident with its BWR line.

As a result, the light water reactor line is expected to become even more popular in the future, and the "medium and small light water reactor development and utilization system investigating committee" established in December last year by MITI can be construed to reflect this sentiment. However, this light water reactor uses uranium 235 enriched to about 3 percent concentration as the fuel, and a light water reactor of 1 million kW class will produce about 1 ton of plutonium a year. At present, the plutonium thus produced by the light water reactor is accumulating steadily without being utilized. How this plutonium stockpile is to be utilized will have an important impact on the nuclear power generating system, because the nuclear fuel cycle differs from one type of nuclear reactor to another. In order to utilize this plutonium as fuel again for the purpose of power generation, the uranium and plutonium contained in the waste nuclear fuel must be extracted. This calls for the reprocessing of the waste nuclear fuel. Reprocessing of the nuclear fuel is entrusted to Great Britain and France while the reprocessing plant is being built in Japan today. Based on the Tokai plant of the PRNF which is in operation today (design capacity 200 tons), there is a plan to build a reprocessing plant having an annual capacity of 1,200 tons in the 1990's.

As to the utilization of plutonium recovered from reprocessing, the favorite is the FBR which uses plutonium exclusively and produces more nuclear fuel than it consumes. However,the FBR is not expected to become a reality until around 2010, so the urgent problem at hand is how this plutonium ought to be utilized in the meantime.

How Plutonium Ought To Be Utilized

There are two ways of utilizing this plutonium. One way is to burn plutonium in the light water reactor (called plutonium thermal) and the other is to utilize it in an ATR. The electric power companies are inclined to push aggressively for the plutonium thermal.

Moreover, the nuclear power section of the general energy investigation commission has recently approved an interim report recognizing plutonium thermal. Based on this report, MITI is in the process of drafing a concrete system.

This interim report provides a blueprint for achieving regular utilization of plutonium in three steps. The first stage consists of a small-scale process experiment in which two to four of plutonium mixed oxide fuel rods will be used among 300-350 fuel assembly rods. Then, starting in the late 1980's, a proven reactor of practical scale in which plutonium fuel occupies one-third of the total fuel assembly will be tested for effectiveness. Finally, a practical application stage is to be reached in the mid 1990's.

Based on this, MITI has begun to step up preparations, in cooperation with the Science and Technology Agency (STA), for a small-scale proving experiment to be carried out at Mihama by the Kansai Electric Power and at Suruga by Nippon Nuclear Power. On the other hand, in regard to the management system, the electric business laws and the nuclear reactor regulations were revised to strengthen the protective measures so that the plutonium fuel cannot be removed from the plant. Moreover, in preparation for the practical application stage, the private sector must also be readied. Establishment of a new company in which the concerned enterprises such as the electric power companies would jointly invest is being investigated.

Thus, significant progress has been made toward the practical utilization of the plutonium thermal. However, technically speaking, "plutonium thermal is not very difficult technically; practical utilization of it can be realized with confidence by 1990" (according to Masatoshi Toyota, chief of Nuclear Power Development Headquarters, executive director of Tokoyo Electric Power).

However, the plutonium thermal has its share of problems. Due to the fact that plutonium may be used as a raw material for nuclear weapons, construction of a plutonium thermal must be approved internationally according to the nuclear nonproliferation treaty. Moreover, plutonium thermal is originally a technology developed by the United States, so U.S. consent is the premise for its application. Its use was practically stopped by a ban on the plutonium thermal issued by the Carter administration in 1979 in accordance with the nuclear nonproliferation treaty.

However, after the Carter administration was replaced by the Reagan administration MITI became somewhat optimistic about the matter: "The United States understands Japan's situation concerning the peaceful application of plutonium. A number of problems can be solved comprehensively through negotiation with the United States."

However, the viewpoint of the STA is quite the opposite: "The United States has been against the plutonium thermal consistently throughout the negotiations between the two countries on the reprocessing of plutonium. The U.S. stand cannot be expected to change."

MITI and the STA at one time opposed one another vehemently concerning the introduction of the CANDU reactor. Their viewpoints are again widely different concerning the possibility of the plutonium thermal. In regard to the introduction of the CANDU reactor, the STA insisted that "domestic technology ought to be free from using light water reactors," and it is also contemplating use of the ATR, a pseudo-domestic technology, for the utilization of plutonium.

In order to push forward the plutonium thermal, MITI is said to be hastening to make adjustments with the STA. However, it is doubtful at present that the adjustment will progress smoothly.

Economic Feasibility of ATR Has Many Problems

The ATR, Japan's first pseudo-domestic made reactor, was developed mainly by the PRNF as a national project beginning in 1967.

The ATR prototype "Fugen" (capacity 165,000 kW), which was constructed at Suruga, Fukui Prefecture, has been in regular operation since March 1979. The fact that the EPDC cooperated in the construction and operation of the "Fugen" was mentioned before.

Uranium 238 in the fuel absorbs neutrons and burns, and then changes into nuclear fission type plutonium 239. This process is commonly known as conversion. This conversion ratio is 0.5 in the light water reactor and as high as 0.8 in the ATR. That is how it got its name: advanced thermal converter reactor. Moreover, it is also called a heavy water reactor in contrast to the light water reactor, because it uses heavy water (specific weight 1.1), which does not absorb neutrons very well, as the moderator.

The CANDU reactor is also a type of heavy water reactor, and it uses natural uranium as fuel. In contrast, the ATR is quite versatile. It can burn used nuclear fuel, residue obtained after enrichment, degraded uranium, and plutonium singly or in combination as its fuel. The fact that the ATR can use plutonium as fuel drew attention in this era of plutonium utilization.

The atomic power commission, which recommends the ATR in a relief role until the FBR becomes practical, cites the following reasons; 1) It is a domestic technology. 2) It is easier to gain the understanding of the United States for it than for the plutonium thermal. 3) It is directly connected with the security assurance of the nuclear fuel cycle as part of the nuclear power complementary line. In regard to its questionable economic feasibility, an economic effect comparable to that of a coal thermal power plant is said to be achievable if about 10 ATR power plants are built.

On the other hand, the power companies are cool toward the ATR for the following reasons: 1) Its construction cost and the unit power cost are both higher than those of the light water reactor. 2) A considerable sum of money must be spent on the establishment of the nuclear fuel cycle, including a nuclear fuel reprocessing plant, uranium enrichment and waste material treatment. 3) They prefer the plutonium thermal and want basically to push for its development.

The economic feasibility of the ATR is the greatest drawback which concerns the power companies most. Because, once built, the power companies will be responsible for the power it generates. According to an estimate made by a special section of the atomic power commission, the unit construction cost based on operation starting in 1985 comes to 490,000-540,000 yen per kW, which is 1.7-1.9 times that of the light water reactor. Moreover, the unit electricity cost comes to 22-23 yen per RWH, which is considerably higher than the 11-12 yen per kWh for the light water reactor.

The construction cost of the ATR proven reactor, also estimated by the special section, is said to be as high as 296-322.5 billion yen for a unit having an output capacity of 600,000 kW. The cost can come down somewhat if it is mass produced, to the order of 190-230 billion yen if 10 units are built. This is still 10-30 percent more expensive than the light water reactor. The Suruga No 2 unit (pressurized light water reactor) being planned by Nippon Nuclear Power is estimated to cost about 370 billion yen for an output capacity of 1.16 million kW. Thus the ATR is at a disadvantage in every respect.

Nuclear Reactor Makers Are Also Negative

However, the ATR has the advantage of being able to use plutonium as fuel. Although the plutonium thermal has been banned by the U.S. nuclear nonproliferation policy, the ATR is a reactor uniquely Japanese, so nuclear proliferation can be prevented if the use of plutonium as fuel is approved. On the other hand, approval of the plutonium thermal for Japan as an "exception" and not for other countries will not go down well. However, approval of the ATR, which is uniquely Japanese, may go well as an exception.

The atomic power commission's assessment of the siturataion is correct on this point. However, there are problems even here. Whether it is the plutonium thermal or burning plutonium in the ATR, it is no more than a "link" between the FBR and the present. Because, when the FBR becomes practical, not only the plutonium thermal but also the ATR will become obsolete. Therefore, it is more advantageous to start work on the plutonium thermal than to construct the ATR.

According to a long-range plan drafted by the atomic power commission, the FBR is to become the mainstream of future nuclear power generation, and its practical application is expected to be realized around 2010. The prototype "Monju" will be brought to criticality around 1990, and the construction of a proven reactor will also begin at about the same time.

The experimental FBR "Joyo" (ultimate output 100,000 kW) reached criticality in April 1977. A go sign has been given to the construction of the "Monju" (electric power output 280,000 kW), and construction work is expected to begin next year.

However, no matter what one may say, the most outstanding FBR is France's "Super Phoenix." The FBR "Super Phoenix" proven reactor, which has its criticality targeted for 1984, is more of a commercial reactor according to its output (1.2 million kW). If the operation of this reactor can be carried out smoothly; there is no doubt that it will have profound impact on Japan's nuclear power strategy.

If for any reason, including delay in technology development and the economic factor, "the FBR is to be imported from abroad" as the light water reactor, was, then practical application of the FBR may be realized earlier than expected, and the situation of the ATR, which is to play a relief role, will be even more disadvantageous. Because a period of 10 years will be required to complete the construction of an ATR proven reactor, and there is no telling what might happen during that time.

Therefore, whether an ATR proven reactor will actually be constructed remains a question. The future of the EPDC, which is to undertake the construction of the ATR proven reactor, is full of difficulties.

This sentiment is reflected more clearly in the action taken by the Japanese plant makers.

When a go sign was given for the construction of the ATR proven reactor, Hitachi expressed its willingness "to positively tackle the task of commercializing the ATR." It appeared natural for Hitachi to be eager to construct the ATR proven reactor because it participated in the development of the ATR from the early days and it played the central role as the competent company in charge of overall coordination of the construction work on the "Fugen" carried out jointly by a number of companies.

However, Mitsubishi Heavy Industry and Toshiba are not expected to offer themselves as candidates for the position of competent company even though they will work in cooperation with Hitachi for the construction of the proven reactor under Hitachi's leadership. These three nuclear reactor makers used to compete furiously for the development and order of a light water reactor, so the situation concerning the ATR is conspicuously different. They figured that the number of plants to be built cannot be too great even if the commercial ATR becomes practical. Therefore, it will be better to put more effort into the FBR as a matter of policy.

No Problem Whatsoever Technically

The atomic power commission requested the cooperation of electric power circles in the construction of the ATR proven reactor starting this year. About this, the atomic power commission expresses its basic ideas as follows: 1) It would like to hear the recommendation of the private sector concerning the core undertaker. 2) The public and private sectors will bear an appropriate share of the cost. 3) The Plutonium thermal will be developed at the same time the ATR is being constructed.

Electric power circles expressed their opinion: "There are a number of problems concerning introduction of the ATR into the existing nuclear power generating system, so only one unit of 600,000 kW capacity should be constructed for the time being. Appointment of the EPDC as the core of undertaking this business seems appropriate." The EPDC was appointed to undertake the construction of the ATR as "recommended" by electric power circles, and that was the whole story.

The statement that "there are a number of problems concerning introduction of the ATR into the existing nuclear power generating system" was not only based on the idea that the plutonium thermal remained the main theme, but also on the concern that "although it is called a proven reactor, it is far too large in scale for a prototype." So, they agreed to cooperate in constructing just one unit. This situation is almost identical to that occasion in 1978 when electric power circles agreed to the introduction of a CANDU reactor in the form of a "proving reactor." Electric power circles opposed the introduction of the CANDU reactor at that time. However, they also realized that it was impossible to oppose it to the end, so they came up with the idea of a "proving reactor." They also conceived of a "proving reactor-like" proven reactor for the ATR proven reactor this time.

Even after agreeing to cooperate in the construction of the ATR proven reactor, electric power circles were on guard against matters concerning sharing of the construction cost: "The greater part of the proven reactor was originally part of a national policy" (says Gaishi Hiraiwa, president of the Electric Business Association). They expect the government's positive support. Of the total of approximately 300 billion yen of construction cost, electric power circles and the government will be responsible for about 30 percent each and the rest will be funded by a low-interest rate government fund -- this is what electric power circles desire.

On the other hand, President Tyokaku said: "The EPDC is honored to be placed in this position (by this appointment) in its 30-year history" when it was decided that the EPDC was to undertake the construction of the ATR proven reactor. On the other hand, he also said: "I have no particular impression, except to be deeply impressed by the importance of the responsibility to be appointed to undertake for the first time a project in the field of nuclear power. I will do my best to carry out this new task." To the EPDC, construction of an ATR proven reactor was something that fell from the sky, so there must be a number of impressions. Therefore, the expression "no particular impression" expresses on the contrary a complicated emotion.

However, there is no problem whatsoever as far as the capability of the EPDC for constructing an ATR proven reactor is concerned. The EPDC at present has a total of 200 technical personnel, including 60 in nuclear power development, 40 who went on leave to work with the PRNF, and 100 trained in nuclear power engineering. However, there is still a problem concerning how to handle the CANDU reactor. According to president Ryokaku: "The appointment to construct the ATR and its own CANDU reactor project are unrelated. It will continue to carry out a general investigation over a period of 2 years as usual," indicating clearly that there is no change in the basic policy. If so, the 200 technical personnel cannot all be assigned to the ATR construction project. It appears very difficult from the viewpoint of capital to put on a double feature show consisting of ATR and CANDU reactors both incurring enormous construction costs. In short, it is safe to assume that the CANDU reactor cannot be introduced easily, and there is no telling whether the project of constructing an ATR proven reactor may be discontinued due to unforeseeable circumstances over a period of more than 10 years, so it is laden with a mountain of difficulties. That is why the EPDC cannot sever its tie with the CANDU reactor completely. The EPDC undertook the introduction of the CANDU reactor because it considered "it should not do the same thing everybody else is doing," and now it is going to undertake the ATR proven reactor which does not belong to Japan's nuclear power generating system. Although this is the "fate" of the EPDC to be complementary to electric power circles, it is right to be satisfied in this role forever? The ATR project will be a "touchstone" of the EPDC's ability.

9113
CSO: 5100/4541

BRIEFS

IAEA EXPERTS VISIT--Three experts of the IAEA are visiting the country. Their visit is aimed at basically coordinating with the National Atomic Energy Commission (CNEA) the implementation of a regional project in this field. The visitors are Joseph A. Quartey, Kenneth Beswick and Ha Vinh Phouhg, Ghanaian, English and Vietnamese respectively. Yesterday they were received at the CNEA headquarters--which is under the Ministry of Industry and Energy--by national officials. [Excerpt] [PY112109 Montevideo EL DIA in Spanish 26 Oct 82 p 7]

CSO: 5100/2009

INVITATION FROM NIGER TO PARTICIPATE IN URANIUM EXPLORATION

Kaduna NEW NIGERIAN in English 25 Oct 82 p 7

[Article by Omoghene Onojake]

[Text]

...

NIGER Republic has invited Nigeria to participate in her exploration of uranium and to hold shares in her phosphate industry.

The Minister of Mines and Power. Alhaji Muhammadu Ibrahim Hassan, announced this when he and the Niger Republic Minister for Mines and Industry. Mr. Uomar Diallo, paid a courtesy call on the Governor of Plateau State Mr. Solomon Lar.

Alhaji Muhammadu said that the bond of economic and political friendship between the countries became strengthened in 1972 when Niger Republic entered into an agreement with Nigeria for the supply of 30 megawatts of Hydro Electric Power from Kainji Dam to Niger.

He revealed that Niger Republic had started bringing tin ore to Jos, Plateau State for smelting as an added impetus to the already existing economic relationship between the two countries.

The minister announced that his ministry, had through the Nigerian Mining Corporation. produced 7,030 tonnes of tin. 826,000 tonnes of stone aggregate, 21. million tonnes of bricks, 90,000 metric tonnes of marble and 1,190 tonnes of columbite.

Alhaji Muhammadu also announced that the ministry had planned to spend 1.9 million Naira for the reclamation of old mining pits in Plateau State, this year.

He disclosed that about 6,000 Naira had been expended by the Federal Government for the reclamation of such pits since 1980.

The figure showed that 325,000 Naira was spent to reclaim mining pits in Barkin-Ladi, 500,000 Naira for pits in Vom and environs and the notorious "killer pond" behind Saint Murumba College, Jos.

Alhaji Muhammadu commended the Plateau State Government for its co-operation with his ministry and urged the Plateau State Governor, Mr. Lar to continue in this spirit.

In his speech the visiting Niger Republic Minister for Mines and Industry, Mr. Uomar Diallo, said there had been economic, geographical and cultural link between Niger and Plateau State which he said would be enhanced by his visit.

He said that Niger Republic had gained much experience from tin mining in Jos and that it had been transfered to his country.

Governor Solomon Lar in response stressed that Niger and Nigeria had many things in common which he said had enhanced the good relationship existing between the two countries.

He thanked the Niger Republic Government for her kind gesture in inviting Nigeria to participate in her economic ventures.

Mr. Lar called on the Niger Republic Government to also participate in Nigeria's Oil Industry in order to strengthen the economic ties between the two nations.

The governor said the establishment of the phosphate industry in Niger Republic would lead to self-sufficiency in fertiliser production.

On the minister's entourage were the Niger Republic Ambassador to Nigeria, Alhaji Mohammed Awami, as well as senior officials of that country's Mines and Industry Ministry.

CSO: 5100/4

BRIEFS

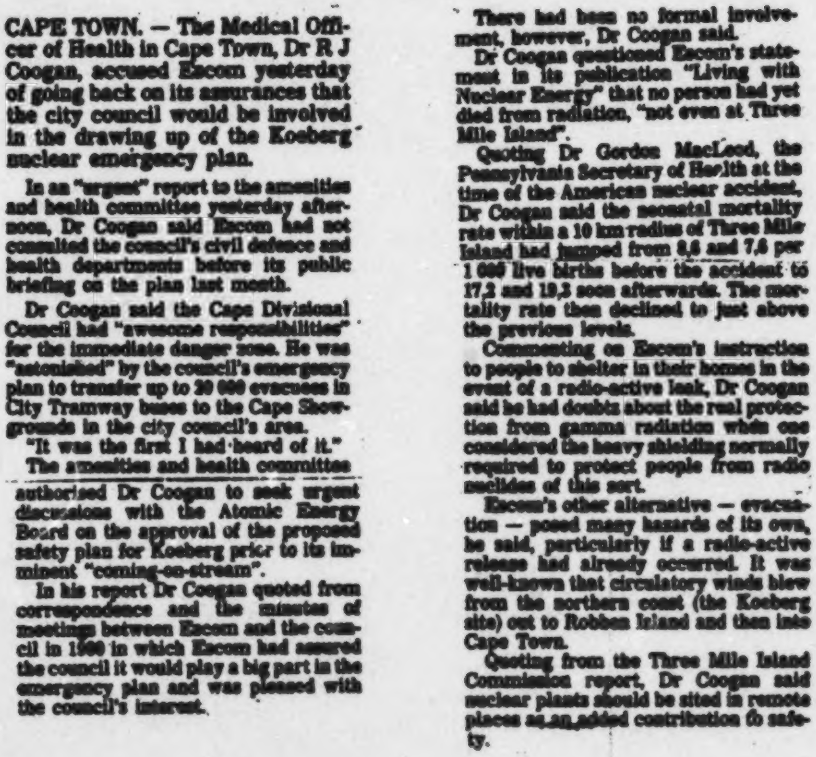
NUCLEAR POTENTIAL--Lagos, 23 Oct--Nigeria has the potential to begin a nuclear energy programme, according to visiting Niger Minister of Mines and Industry, Oumar Diallo. Mr Diallo, quoted by the news agency NAN, told the governor of the northeastern state of Bauchi that this was the reason for his country signing a cooperation agreement with Nigeria for the exploration of uranium deposits in both countries. Nigeria supplies energy to Niger. (A.F.P.) [Text] [Paris AFRICA AFP in English No 2944, 26 Oct 82 p 9]

CSO: 5100/4

ESCOM RAPPED OVER NUCLEAR SAFETY PLAN

Johannesburg RAND DAILY MAIL in English 2 Nov 82 p 3

[Text]



CAPE TOWN. — The Medical Officer of Health in Cape Town, Dr R J Coogan, accused Escom yesterday of going back on its assurances that the city council would be involved in the drawing up of the Koeberg nuclear emergency plan.

In an "urgent" report to the amenities and health committee yesterday afternoon, Dr Coogan said Escom had not consulted the council's civil defence and health departments before its public briefing on the plan last month.

Dr Coogan said the Cape Divisional Council had "awesome responsibilities" for the immediate danger zone. He was "astonished" by the council's emergency plan to transfer up to 20 000 evacuees in City Tramway buses to the Cape Showgrounds in the city council's area.

"It was the first I had heard of it."

The amenities and health committee authorised Dr Coogan to seek urgent discussions with the Atomic Energy Board on the approval of the proposed safety plan for Koeberg prior to its imminent "coming-on-stream".

In his report Dr Coogan quoted from correspondence and the minutes of meetings between Escom and the council in 1980 in which Escom had assured the council it would play a big part in the emergency plan and was pleased with the council's interest.

There had been no formal involvement, however, Dr Coogan said.

Dr Coogan questioned Escom's statement in its publication "Living with Nuclear Energy" that no person had yet died from radiation, "not even at Three Mile Island".

Quoting Dr Gordon MacLeod, the Pennsylvania Secretary of Health at the time of the American nuclear accident, Dr Coogan said the neonatal mortality rate within a 10 km radius of Three Mile Island had jumped from 8,6 and 7,6 per 1 000 live births before the accident to 17,2 and 19,3 soon afterwards. The mortality rate then declined to just above the previous levels.

Commenting on Escom's instruction to people to shelter in their homes in the event of a radio-active leak, Dr Coogan said he had doubts about the real protection from gamma radiation when one considered the heavy shielding normally required to protect people from radio nuclides of this sort.

Escom's other alternative — evacuation — posed many hazards of its own, he said, particularly if a radio-active release had already occurred. It was well-known that circulatory winds blew from the northern coast (the Koeberg site) out to Robben Island and then into Cape Town.

Quoting from the Three Mile Island Commission report, Dr Coogan said nuclear plants should be sited in remote places as an added contribution to safety.

CSO: 5100/6

BRIEFS

NATIONAL ACCELERATOR CENTRE--The status of the South African Accelerator Centre. A H Botha for the NAC staff. Proceedings of Ninth International Conference on Cyclotrons and their Applications, held in Caen, France, Sept 7-10, 1981, p. 33. A National Accelerator Centre has been established in the Republic of South Africa in the vicinity of Cape Town. Two accelerators, an 8 MeV solid-pole injector cyclotron and a 200 MeV separated-sector cyclotron, are being built. The facilities of the Centre will be available for nuclear physics, isotope production and radiotherapy. Progress with the project and its present status are reviewed. [Text] [Pretoria SCIENTIAE in English JUL-SEP 82 pp 36-37]

8 MeV CYCLOTRON--Aspects of the design of an 8 MeV cyclotron as injector for a 200 MeV separated-sector cycltron. Z B du Toit, S J Burger, P J Celliers, G S Z Guasco, L Roels and H A Smit. Proceedings of Ninth International Conference on Cyclotrons and their Applications, held in Caen, France, Sept 7-10, 1981, p 129. Certain characteristics, design aspects and calculations for the magnet, dees, extraction system and central region of the injector cyclotron are reported. [Text] [Pretoria SCIENTIAE in English JUL-SEP 82 p 37]

BEAM INJECTION AND EXTRACTION--Beam injection and extraction for the separated-sector cyclotron of the National Accelerator Centre. P F Rohwer and S Schneider. Proceedings of Ninth International Conference on Cyclotrons and their Applications, held in Caen, France, Sept 7-10, 1981, p 481. The injection and extraction systems proposed for the NAC separated-sector cyclotron (k = 200 MeV) are described. A wide range of particles, including both light and heavy ions, with variable energy and beam intensities up to 100 uA have to be accommodated. Beam injection is accomplished with two bending magnets in the central region and an adjustable magnetic inflection channel in the pole-tip of one sector magnet to guide each beam onto its centred orbit. The extraction system consists of an electro-static extraction channel and two septum magnets, one of which is mounted inside the resonator. Results of orbit computations and specific design principles of the injection and extraction components are discussed. [Text] [Pretoria SCIENTIAE in English JUL-SEP 82 p 37]

ORTHOGONAL QUADRUPOLE SYSTEM--An orthogonal quadrupole system. C M Merry and J C Cornell. Proceedings of Ninth International Conference on Cyclotrons and their Applications held in Caen, France, Sept 7-10, 1981, p 509. An arrangement of six quadrupole magnets is described which provides completely independent control of the horizontal and vertical phase-space parameters in a beam of charged particles from an accelerator. In fact the system requires only two quadrupole field strengths to be altered to adjust the horizontal size of the final waist, while the vertical waist size remains completely unaffected. Another two quadrupoles control the vertical parameters similarly. This results in a considerable simplification in manual tuning of beam parameters, even when computer-controlled or computer-assisted tuning has been used. The positioning of these quadrupoles can easily be determined using analytic techniques, and the relevant formulae have been derived and evaluated for a number of specific cases. Non-coincident horizontal and vertical initial waists (slits) have also been considered. The versatility of this system is demonstrated by means of beam envelope plots derived from a program using a matrix representation of beam transport elements. [Text] [Pretoria SCIENTIAE in English JUL-SEP 82 p 37]

CONSENSUS ON KOEBERG SAFETY--Koeberg Power station should not become operative until consensus had been reached on emergency measures to cope with a nuclear accident, the Progressive Federal Party spokesman on mineral and energy affairs, Mr John Malcomess, said yesterday. Mr Malcomess was reacting to a report in a Sunday newspaper in which the regional manager of Escom, Mr G. Hellstrom, was quoted as saying the formulation of safety measures for Koeberg was not the concern of the public. "If the public is kept in the dark on matters affecting their safety, they will naturally view the programme with suspicion," Mr Malcommes said. The Cape Town City Council was the official spokesman for the people of the Mother City, yet it had reportedly not been consulted on the proposed safety measures and was dissatisfied with them, Mr Malcomess said. "I, therefore, call on the Minister of Mineral and Energy Affairs to convene a meeting of the Cape Town City Council, the Divisional Council, Escom and the Atomic Energy Corporation as soon as possible to solve the problem." Mr Malcomess said it was apparent that safety measures at Koeberg had become a source of great controversy. "South Africa cannot afford this at the outset of our nuclear energy programme."--Sapa [Text] [Johannesburg THE CITIZEN in English 8 Nov 82 p 9]

KOEBERG WORKERS' SAFETY--Cape Town--The Cape Division Council went into closed session yesterday when a councillor asked if workers were to be given protective clothing in the event of a radio-active leak from the Koeberg power plant. The reply to Mr Clive Bilski's question, plus one on what Escom was doing to protect its employees, was given confidentially to councillors. During the public debate at the monthly meeting, Mr Clive Bilski referred to the council's civil defence plan. The report by the council, in whose area the nuclear plant falls, only deals with the immediate 16 km radius danger zone. The details of proposed "protective action" have caused a lot of concern in city council circles and have been described as inadequate. Both councils are installing their own radio-active monitors. Mr Bilski asked why the report had not mentioned protective clothing for council employees who may be called into the area to help in an emergency. He also asked what Escom was doing to protect its staff. Rising to reply, the Medical Officer of Health, Dr L.R. Tibbit, said he had more information but that it was confidential. [Text] [Johannesburg RAND DAILY MAIL in English 28 Oct 82 p 5]

CSO: 5100/6

BADEN-WUERTTEMBERG LANDTAG MODIFIES POSITION ON POWER PLANT

Frankfurt/Main FRANKFURTER ALLGEMEINE in German 1. 14 Oct 82 p 8

[Text] New positions have become evident in the political discussion in the Baden-Wuerttemberg Landtag about the planned nuclear power plant Sued in Whyl--a symbol of the 10-year controversy surrounding nuclear energy in the FRG. The local government and the CDU fraction diverged from the projected annual growth rate figure of at least 5 percent for power requirements in the South-West. They base their growth rate figure of 3 percent on prognoses made by the FRG government. This means that the construction of a nuclear power plant in Wyhl is no longer considered to be as urgently needed as before. In spite of this,--according to a government declaration by minister president Spaeth--by 1992 there will be a deficit of 1,900 megawatt of nuclear power capacity in Baden Wuerttemberg, if Wyhl is not built.

The SPD in the Stuttgart Landtag, which became the leader in the fight against the constructionof new nuclear power plants a few years ago under Eppler's leadership, also modified its position. In the words of fraction chairman Lang, it is no longer opposed to new nuclear power plans as a matter of principle, but in the Wyhl case it is of the opinion that a coal power plant in the South of Baden would suffice in meeting projected additional power requirements. The controversy ended in the question of what is more meaningful: the modernization of uneconomical and air polluting old coal power plants, or their replacement with the planned new atomic power plant in Wyhl.

Spaeth stated that because of air pollution caused by the old plants, the country could not afford to continue using a number of them after 1990, which would by that time have been in operation for 30 years. Without a new atomic power plant there would also be no possibility of reducing the 38 percent import figures for electrical current. Without the Wyhl plant, the considerable lack of cheap basic current would also continue. In its judgment in March of this year after a 7-year court battle for the first partial construction permit granted in 1975, the Mannheim court has called all safety concerns by the project's enemies insignificant, and has even judged the 1975 level of safety technology sufficient. This decision would allow for immediate construction.

But in spite of this, according to Spaeth, the local government in Stuttgart would accept additional loss of time and higher costs in order to apply the latest construction technology of 1980 in Wyhl. For parts of the installation this would require a new application for permit. Spaeth wants to have talks with local politicians and clergymen of the communities and associations involved even before the decision. Then the decision regarding Wyhl is to be made, if possible still in the fall of 1983. It is questionable if construction will begin before the spring 1984 Landtag elections. Resistance is expected, not only from the opposition parties in the Landtag, the environmentalists, and the still very active Baden-Elsass citizens initiatives, but also from the local CDU, which wants to prevent at least the planned for cooling tower for the Wyhl project.

CHANGE OF POLICY ON HESSE REPROCESISNG PLANT

2. 19 Oct 82 p 4

[Text] The Hessen SPD minority government is obviously trying to get away from a nuclear reprocessing plant project in Hessen. There were already indications of this during the Landtag campaign, but now a first visible step in this direction was taken by Minister President Boerner. In a letter to the German Society for Reprocessing Atomic Fuels (DWK) in Hannover, he demanded a clear statement as to which of the sites tested in Hessen, Bavaria and in Rheinland-Pfalz the concern planned to chose for such an installation.

In case Boerner does not receive a satisfactory response, he is likely to withdraw his approval for nuclear testings in the North Hesse site Frankenberg-Wangershausen; he would then give the responsibility for it to the DWK. Boerner's move had been expected in Wiesbaden for various reasons. For one, the FDP, which until now had emphatically furthered the reprocessing in Hessen, is no longer represented in the cabinet after the retirement of its two ministers; secondly, Boerner, who had given his word to the government that he would test the reprocessing portion of the chain, no longer felt committed after the change-over in Bonn.

In his communication to the DWK, Boerner argued that the Hessen population could no longer be asked to bear the uncertainty as to whether the undertaking would in fact continue to pursue its application for permit for Frankenberg, or whether it would withdraw its application in favor of another site. Hessen had agreed to the application in 1979 under the condition that in the entire FRG only one single installation would be constructed for the testing of technology. Boerner refers to the fact that in the meantime sites in Schwandorf (Bavaria) and Kaiseresch (Rheinland-Pfalz) were being tested as possible alternatives. However, this has already been going on for months without Boerner making any inquiry regarding it at the DWK. Nor was this necessary, because Hoffie (FDP), his finance minister at the time, had made internal inquiries in Hannover already in March of this year as to whether there would be a continuous interest in a reprocessing plant in Hessen; as reason for his inquiry he stated that the DWK's various testing procedures had caused some doubts. The DWK administration attempted to alleviate these doubts in a letter to Hoffie dated March 20 of this year. It spoke of the "urgent necessity for a quick realization and thus the uncontested priorty" of the planned for 350 ton demonstration installation at a site in Hessen.

The society's activities in other lands--the letter continues--did not conflict with the interest in the planned for installation in Hessen, which is necessary not only for the safety of nuclear power plants but also for "the continuity of technological development." The administration promises in the letter that the project would be materialized "immediately" as soon as the suitability of a site had been proven and the first legal partial permit had been granted. "Possible and meaningful preliminaries" ---land purchase is probably meant by that--would "happen at the proper time." The administration hopes that with this letter it has made unmistakably clear its unchanged firm intention to make "a reprocessing plant in Hessen a reality."

9328
CSO: 5100/2505

RESEARCH MINISTER TO PROMOTE DISPOSAL TECHNOLOGY

Duesseldorf HANDELSBLATT in German 7 Oct 82 p 3

/Report by wff, datelined Bonn, 6 October 1982: "Highest Priority for Dispcsal Technology"/

/Text/ Heinz Riesenhuber, new federal minister for research and technology, intends to emphasize the promotion of nuclear disposal technology.

Last Wendesday, in his first press conference since taking office, the minister also confirmed the key issues of his policy as earlier stressed in remarks to HANDELSBLATT (see HANDELSBLATT, 4 October 1982): As quickly as possible to secure financing for the advanced reactor types fast breeder and high temperature reactor, and more emphatically promote the transfer of technical knowledge to actual practice.

Riesenhuber said he intended to emphasize the promotion of disposal concepts. This is a condition for the responsible use of nuclear energy. At the same time he wishes, together with the Federal Minister of the Interior, the Federal Minister for Economics and the Laender, to improve the organizational and legal prerequisites. The new minister hinted that, possibly, not all risks in terms of time and costs had been ascertained with regard to nuclear disposal. He is going to thoroughly study the issue, because a proper opening balance is crucial.

Riesenhuber left no doubt that he expects industry to provide a greater contribution to the advanced reactor types. The pressures here are enormous, and the situation cannot be dealt with exclusively by spending public money. In fact Riesenhuber foresees further moneys from the general budget to a very limited extent only. The important partial construction permits for the fast breeder and the lifting (he recommended) of the parliamentary reservations with regard to the start of operations, resulting from the majority decision by the Bundestag Energy Inquiry Committee. have improved the climate for a contribution from industry. The current scenario permits the restoration of planning security. Riesenhuber expects the reassessment of the new projects, initiated by his predecessor von Buelow (SPD), to be concluded in a few weeks time. He will then have a basis for factual negotiations with industry regarding both projects.

Riesenhuber says he wants to cautiously set new emphases for the coming years. He also intends to maintain continuity regarding personnel and has therefore asked State Secretary Haunschild to remain in office. At the same time he considers it imperative to exmine whether the multitude of pojrects is in fact necessary and manageable, and where new key issues are likely to emerge. Studies will have to determine, for example, what tools of indirect research promotion might be more emphatically employed, for example for the microelectronics program. The new minister also wants to find out why it is that, despite a relatively large allocation of money to basic research, the output of real top performances at international level is not very great.

Promotion of basic research, though, is bound to continue a priority for the ministry. Riesenhuber will try, in the meaning of better acceptance of large-scale technical establishments, earlier to spot risks and quickly pass them on to research and development instead of, after the event, imposing environmental framework conditions on new plant.

11698
CSO: 5100/2509

ITALIAN-MADE HEAVY ION ACCELERATOR TANDEM XTU DESCRIBED

Milan SCIENZA E VITA NUOVA in Italian Nov 82 pp 71-75

[Article by Piero Piazzano: "In Italy, the Most Powerful Heavy-Ion Linear Accelerator--A Probe into the Nucleus of the Atom"]

> [Excerpts] The Tandem XTU, an accelerating machine that can be of service to physicists, physicians and engineers, is about to go into service at Legnaro. The designer talks about it.

"Let us imagine that the Martians take it in mind to study the organization of human society and that they decide to tackle the problem by dividing into groups. The first group would be able to study persons individually as elementary constituents of society; the second group could take on study of the primary nucleus of organized society, the family; and the third would concern itself with the organization of the city, or the state, as an example of organized society in a complex form. For each of the three groups we can have a corresponding group of physicists: respectively, the subnuclear physicists, who study the elementary particles; the nuclear physicists, who study the atomic nucleus; and the atomic physicists, who study the structure and organization of condensed matter."

This analogy between physics and sociology is by Prof Renato Angelo Ricci, in charge of Project Tandem in the National Laboratories of Legnaro (province of Padua) of the National Institute of Nuclear Physics (INFN). As a "Martian," Prof Ricci belongs to the second category: he is a nuclear physicist, and Project Tandem, for which he is responsible, is one of the most advanced research instruments for those who study atomic nuclei.

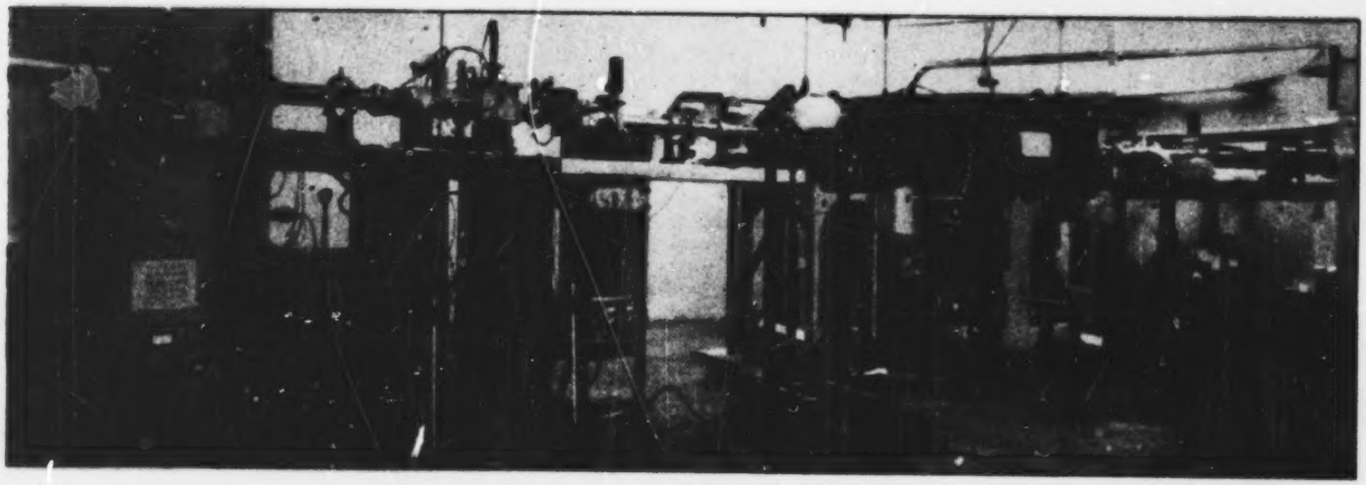
The Tandem XTU accelerator was officially inaugurated on 21 January 1982, on the occasion of the 20th anniversary of the establishment of the National Laboratories of the INFN at Legnaro; but, adds Ricci, "the real scientific inauguration will take place next spring, when an international meeting devoted to the physics of heavy-ion accelerating machines will be held at Legnaro." By that time, the preliminary checkout and performance-characteristics testing of the machine will have been completed, the necessary authorizations from the ENEA [National Committee for Research and Development of Nuclear and Alternate Energy] and the competent ministries will have arrived, and the machine will have begun to function full-time.

The interior of the Tandem of Legnaro. It will be used for study of the structure of the atomic nucleus.

Ricci says: "A machine like the Tandem can be used to recreate in the laboratory the reactions that nuclei produce inside stars: in the Tandem, the reactions are primed in order for nuclei that are made to 'melt,' breaking the Coulomb barrier, to accelerate, while in the stars, the energy is furnished when the stars 'boil'--that is, when several elements 'burn' and produce others."

One function of the Tandem, then, is to reconstruct the "unicorn," or the "mammoth," or the future products of evolution in the zoology of nuclei; but we think we understand that this function is not the only one.

"No, of course not. We know well only 10 percent of the matter of which the universe is made--500 nuclei out of 5,000--and the Tandem can help us amplify this knowledge. But the Tandem can also be used to produce reactions that prime new phenomena that we do not know--for example, the fact that matter is organized in so-called giant structures. Clarifying these phenomena makes it possible to lay a bridge between nuclear physics and subnuclear physics, because with these experiments it can be verified whether the primary interactions proposed by the theories of subnuclear physics are really the valid ones for describing the behavior of the first phase of construction of matter."

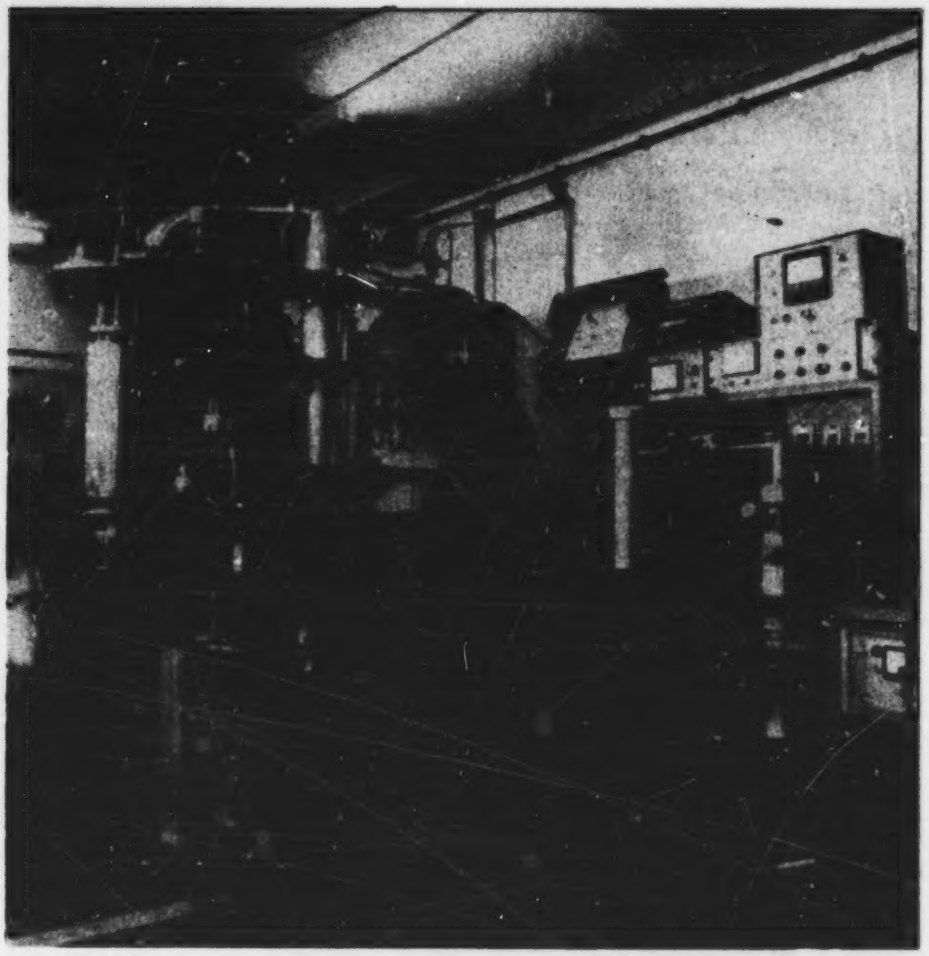


View of the tube in which the ions accelerated at high energy travel and of the magnet that directs the beam into the channel. The measuring instruments are placed at the end.

And there is no lack of surprises: one sees in the following article, for example, what has happened at Berkeley, where a heavy-ion accelerator has discovered strange nuclear structures that the physicists have christened with the name of "big anomalies."

The Function of the Microelements

But in nuclear physics, not only pure research is done: the Tandem can be used also, and extensively, for doing applied research--that is, research that is immediately transferable to technology, in



Refrigerator set with which the target is cooled to 15 mK, a temperature close to absolute zero.

many sectors. "For example," Prof Ricci continues, "in the field of biophysics, the techniques of nuclear spectroscopy are far superior to those of chemical analysis. With our accelerator, it will be possible to improve the techniques for detection of microquantities of elements present in organic tissues. Here at Legnaro, the group directed by Prof Moschini, professor of medical physics in the University of Padua, is concerned with these matters."

The use of accelerators in mass spectroscopy is not new and is based on the effects that proton bombardment produces on the field under study; and from the effects one can go on to the composition of the sample, with very high precisions. With a heavy-ion accelerator such as the Tandem of Legnaro, even more can be done: the nuclei themselves of the substance under examination can be accelerated and a "nuclear spectrum" of its components can be obtained as a result, with a precision that makes it possible to recognize one atom dispersed among 10 million different atoms.

"One interesting development from these techniques," wrote Prof Moschini with regard to the Tandem's applications to biophysics, "has to do with study of tumoral processes, which, it seems, can be promoted or inhibited by the presence of microscopic quantities of elements."

Analogously, it will be possible to use the Tandem for knowing the age of organic and inorganic substances by applying with greater precision and on smaller samples the dating methods based on radioactive decay. Finally, studies will be done with the Tandem on materials, both from the point of view of their composition and as regards their behavior in the presence of radioactive nuclei.

It is a field of research that brings us close again to the application that made nuclear physics famous: nuclear fission and its peaceful applications (reactors) and military ones (bombs).

But apart from the research on the properties of materials, as referred to above, the physicists who will work with the Tandem will not be concerned with either of them.

"No," concludes Prof Ricci, "those sectors no longer have anything to do with physics; they have now gone into the field of engineering."

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TESTING FEASIBILITY OF BURYING NUCLEAR WASTE IN ROCK CONTINUES

Tests in Granite Mine Tunnels

Stockholm DAGENS NYHETER in Swedish 23 Oct 82 p 13

[Article by Eric Dyring: "Nuclear Safety Tested in Depths of Mine"]

> [Text] The durability of Swedish granite is being tested 53 kilometers north of Orebro and 360 meters under the surface. Can it safely retain the highly radioactive waste from nublear power plants?

The old Stripa mine in Bergslagen in its old age has become the home for an intensive international research project.

Research work has been going on since 1977. The whole thing began the year before. The Swedish Nuclear Power Plant Act demands that power companies must show the harmless nature of the entire nuclear power system. Otherwise no new nuclear power plants could be placed into operation.

One of the big problems concerned the safe handling of nuclear fuel. Svensk Karnbransleforsorjning AB (SKBF) was formed to develop the route for nuclear fuel from discovery to final safekeeping.

Stripa Mine

At the same time the mining company Stallberg AB decided to shut down the Stripa mine in Bergslagen. Since the 1400's it had produced iron, but now it was finished. Around the old ore-bearing deposit lay granite, ideal for the study.

On location there was already a mineshaft, passageways, material and trained personnel.

The mine also extended 400 meters down into the earth, which was an advantage. It was considered that the highly active nuclear waste should be placed about 500 meters deep to obtain sufficient safety. SKBF decided to act, and rented the mine.

When these plans were disclosed at a conference in the United States the Americans were interested. They also wanted to research the problem but had no shut-down mines available. They had only the military installations from the end of the 1940's at Hanford in the state of Washington, Savannah River and the Climax project in Nevada. It would cost time and money to create their own test mine. Furthermore public opinion is just as vigilant in the United States as it is in Sweden when dealing with nuclear power activity.

The United States joined and the Stripa project became international. Today it is also an OECD project, through its Nuclear Energy Agency. Canada, Finland, France, Japan and Switzerland are cooperating.

"Sweden is the driving force behind the Stripa project," said the project leader Hans Carlsson of SKBF to DAGENS NYHETER. "Through cooperating in research on the suitability of Swedish granite, Sweden and other participating nations are getting a shortcut to knowledge."

No Storage

"There will be no nuclear waste stored in the Stripa mine," pointed out Hans Carlsson. "It is only used for research and method development."

The Stripa project is now entering its seventh year. The first test period ended in 1980. The second will continue until 1984.

There are many questions that we are trying to get the answers to in Stripa.

The radioactive waste gives off heat. Will that change the properties of the granite? This has been investigated by heating the rock electrically. The investigations, which are now completed, show that it does not effect the solidarity of the granite.

Another important question is how ground water flows through the cracks in the granite. The results show that the rate is very slow, slower than one billionth of a meter per second. That is many times slower than the rate of flow through porous rock.

Decomposition

Just now they are measuring the significance of the chemical composition of the ground water. What is the corrosive effect on the material which will enclose the waste--copper and glass?

And what happens when the enclosing material decomposes, because it is going to do so after a long time. How is the rock going to be effected by the released radioactive substances and how will they spread? These investigations are being conducted by using different kinds of tracers, among other things.

Another area of research involves testing different kinds of fill material.

Now plans are being made for a third test period, which will extend to the end of 1986. England will also participate. Hans Carlsson says that then we will develop, among other things, new methods to map the structure of the granite without boring into the rock. They expect to test seismic methods which can reach 1 kilometer, plus radar. The latter reaches only 50 meters, but gives very detailed information.

The cost for the test period 1980-1984 is a total of 50 million kronor. The new test period is estimated to cost 65 million.

"The international cooperation is going well, but with certain interruptions," said Hans Carlsson. "President Reagan's curtailment policy has also hit the Stripa project. The Americans have not written the final reports according to the plan.

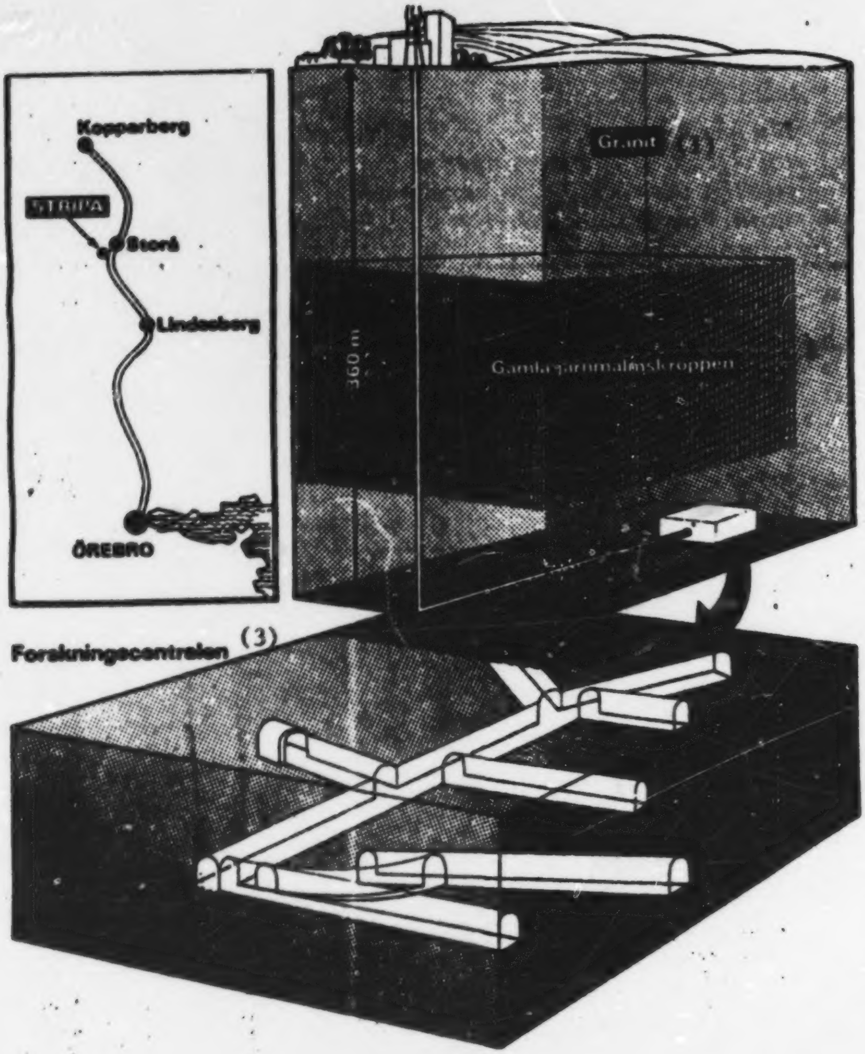
"The shortage of money makes the work go more slowly. That is irritating. But the United States is not expected to withdraw from the cooperation," said Hans Carlsson.

Active Opinion

Next week the researchers and experts are meeting at a working symposium in Stockholm to present and discuss the results from Stripa.

Method development and test are only a first step to safe waste storage. The road toward the first Swedish graveyard for highly active waste from nuclear power plants is a long one. It has to pass through economic and political decisions.

Public opinion is vigilant. As soon as a drilling team starts investigating a rock formation, the local opposition is quickly heard from.


Kopparberg
STRIPA
Storå
Lindesberg
ÖREBRO
Granit (1)
360 m
Gamla järnmalmskroppen
Forskningscentralen (3)

Key: (1) Granite
(2) Old iron ore body
(3) Research station

Caption: 360 meters beneath the old shaft building at Stripa mine in Bergslagen there is a research station. They are investigating, among other things, what happens when the primary rock formation is heated up by radioactive waste.

Effects of Radioactivity in Ground Water

Stockholm DAGENS NYHETER in Swedish 23 Oct 82 p 13

[Article by Roland Gyllander: "Is Waste in Bedrock the Only Possibility?"]

> [Text] To bury nuclear waste in stable bedrock is regarded the world over as the only possible way to be fairly safe that it will continue to be isolated from the biosphere for thousands or millions of years.

To send the waste with a space rocket into the sun, or to bury it deep in the sea where the movement of the earth's crust will grind it down into the earth mantle would perhaps be the most effective, but these methods are unreasonable from a technical and safety standpoint.

Even if the waste is encapsulated in lead and titanium and copper and packed in bentonite clay which expands and seals when the ground water, after a couple of hundred years fills the waste storage, then the capsules after thousands of years will corrode apart and the waste will leak out into the ground water. The uncertainty is over how long a time that will take.

Measurements have shown that it normally takes thousands of years before ground water in finely cracked granite at a half kilometer's depth has returned to the surface. Only in extremely unlucky cases should any noteworthy radioactivity from glass-encapsulated waste reach the surface before it would disappear through decomposition. Here the greatest risks instead are to future tunnel construction or deep water wells in the area.

If the waste instead consists of exhausted fuel elements with large contents of very long-lived radioactive substances--among other things plutonium, neptunium, uranium and radium--the radioactivity is going to reach the surface in amounts which, according to SKBF's calculations give doses of 0.7 mSv (millisievert) per year in 1 million years (in the worst case) or, more likely, 0.1 mSv in 70 million years.

The natural background radiation from the earth and sky now give us 0.7-1.4 mSv radiation dose per year, depending on where we live. The international radiation protection recommendations which Sweden approved give a maximum limit of 0.5 mSv extra radiation per year to the public, or 0.1 mSv in cases where there is prolonged radiation year after year.

The test drilling now going on is to find rock which is free from large crack zones where future dislocation can be expected to take place, but which are still rather finely cracked. Entirely crack-free rock should certainly be ground water free, but because of its rigidity a risky storage place for very long and geologically uncertain time frames. Finely cracked rock is, on the other hand, elastic and functions as a groundwater filter where radioactive substances to a certain extent fasten to the walls (sorption).

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NUCLEAR WASTE FROM FORSMARK PLANT TO BE PUT UNDERGROUND

Stockholm DAGENS NYHETER in Swedish 29 Sep 82 p 6

[Article by Anna-Lisa Backman: "Osthammar Says Yes to Storage"]

> [Text] Last Tuesday night Osthammar town government said yes to the nuclear dump in the bed-rock under the Oresundsgrep at Forsmark. This decision means that the local veto right was not used.

Together moderates and Social Democrats went against members of the Center Party, the Liberal Party, and the Communist Left Party. After the decision, shouts of "Ugh!" and "Hell!" were heard in the meeting room.

After barely an hour's loaded debate a decision was made agreeing to the request of Swedish nuclear resources to build a storage for the final storing of low and medium active waste in the Oresundsgrep. Four weeks ago it was decided to table the question before the election. Now, after the election, the positions were the same as earlier. The Social Democrats were all but one for the proposal. This was Goran Karlson from Gimo who left the meeting and was replaced by a substitute who voted the party line. Goran Karlson emphasized, however, that there was no split between himself and the party.

Meeting Halfway

By accepting the proposal, the town government met the housing authority halfway, as it wanted an answer before the end of September. Several members of the Center Party pointed out that one did not have to follow the authority's request that strictly in such an important question as the decision about waste, but the yes line still won.

At first one voted on reremittance. The position was 30 nays and 19 ayes. And the same numbers were then repeated the other way around when it was a question of agreeing to the storage.

Town government member Edvin Tallberg (S.D.) pointed out that one agreed on the condition that one can have renewed veto right to a planned addition to the storage.

In the debate it was, however, pointed out by the Center Party that the present government cannot promise how future social democratic governments will act on the question.

On the whole, the Social Democrats did not argue much for their position, but tried to keep the promise they had given before the election, namely that the storage would be built. Neither did the members of the Moderate Party say much during the debate, but that one should be pleased that there is a company like Swedish Nuclear Resources that wants to properly handle its waste.

Pleading

One had simply kept the positions from the great debate before the election, which at that time led to tabling.

Still, members of both the Center Party and the Communist Left Party pleaded with the town government to consider the fact that one was deciding upon a great question of the future.

Town government member Arne Hansson (C), who together with Edvin Tallberg runs the district, criticized the housing authority for having forced forth a comment from the district before it had turned all statements from the remitting authorities over to the district.

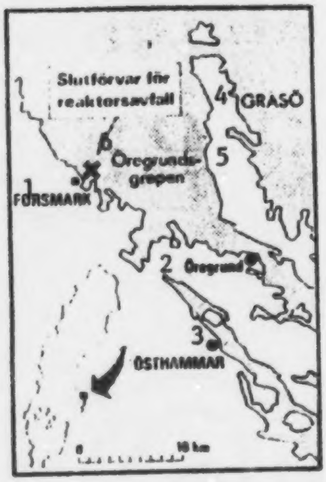
"All investigations according to the nuclear law and the energy law should have been submitted to the town government before we made a decision," he said.

What was now on the town government's table were some newly received sheets of paper that had to be read during the half hour the council adjourned.

Government

Thus, the decision of the town government in Osthammar means that the strong possibilities of refusing the storage were not used which are allowed in the building law. Instead one must now await state considerations and other reports from the nuclear power inspection and the Swedish radiation defense institute. Finally, the government will decide whether the storage may be built.

Because Osthammar is a very vast district, local government meetings are held in different places in the district, and this evening it was at the Central School in Osterbybruk. Unusually many listeners sat along the walls, mostly local advocates of the People's Campaign against Nuclear Power.



Slutförvar för reaktorsavfall
6
Öregrunds-grepen
5
4
GRASÖ
1
FORSMARK
2
Öregrund
3
ÖSTHAMMAR
0
10 km

1. Forsmark
2. Oregrund
3. Osthammar
4. Graso
5. Oregrundsgrep
6. Final storage for nuclear reactor waste.

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